Telephony.

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H. D. FARGO, President and Treasurer
S. R. EDWARDS, Editor and Secretary

H. D. FARGO, Jr., Vice-President and Advertising Manager
D. C. SORENSEN, Western Advertising Manager

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World Telephone Statistics Show The Industry's Development

Telephone statistics covering all the countries of the world, as of January 1, 1930, have been completed, and they reveal many things of interest to those in the telephone industry. It is a changing world we live in, and so far as telephone development is concerned much is happening in all parts of the earth.

This information is compiled by the chief statistician's division of the comptroller's department, American Telephone & Telegraph Co., with the cooperation of the telephone administrations of foreign countries where the telephone systems are government owned, and with the help of many private companies in lands where private ownership prevails.

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According to these reports, on January 1, 1930, there were 34,526,629 telephones in operation on all six continents of the world. On account of the predominance of the United States in the way of telephone development, North America led all continents, with 21,695,376 stations, or 62.84 per cent of the world total. Europe ranked second, with 10,035,580, or 29.07 per cent of the total. Next is Asia, having 1,201,008, or 3.48 per cent of the total.

Oceania (which includes Hawaii, the Philippines, Australia, New Zealand and other islands) ranked fourth, with 771,436 telephones, or 2.23 per cent of the total. South America is fifth, with 587,121 stations, or 1.70 per cent of the total, while Africa comes in last among the continents, telephonically speaking, having 236,108 stations, which is less than one per cent of the total—to be exact, only .68 per cent.

The United States leads all countries, having more than 58 per cent of the world's telephones at the beginning of 1930. The total stations in this country on that date were 20,068,023. At the beginning of 1931 this figure was probably increased by about 133,000, which was under the normal annual gain due to business conditions.

Other sections of the world saw a greater proportionate telephone development in 1930, so that the United States' percentage today is somewhat less than 58 per cent of the estimated world total of 35,300,000 on January 1, 1931.

The other 42 per cent, as of 1930, is distributed as follows: Germany, 9 per cent; Great Britain, 5½ per cent; France, 3 per cent; all other European countries, 11½ per cent; all other countries, 9 per cent, and Canada, 4 per cent.

Both government-operated and privately-operated telephone systems exist in all the six divisions of the world, although, as a whole, the latter predominate. This is due to the fact that the United States' large quota is under private company control. Throughout the world government-operated telephones number 11,117,468, while 23,409,171 are under private management. In North America the government telephones are in Canada, Mexico, Central America and the West Indies, but in all these countries there are also more stations operated by private companies.

South America has 8,046 government telephones and 589,075 stations operated by private concerns. In all the other continents, however, the government telephones outnumber the private stations. Europe, for instance, has 8,795,746 government telephones and only 1,239,834 handled by private companies, as Great Britain, Germany, France, Russia, Belgium, Austria, The Netherlands and Switzerland handle their entire telephone communications through government agency.

* * * *

On the basis of the number of telephones per 100 population the United States leads all the countries of the world, with 16.4. Canada is second, with 14.2. New Zealand is third, with 10.3. Denmark, with 9.6, is fourth and leads all European countries. Then comes Sweden, with 8.3 telephones per 100 people, and, next, Norway and Switzerland, each with the same ratio of 6.7.

Among the continents North America, of course, leads in the number of telephones per 100 population, having 13. Asia is the last with 0.1.

* * * *

San Francisco leads all the cities of the world in telephone development in proportion to population. Per 100 people San Francisco has a fraction more than 40 telephone stations. The nearest to that figure is Washington, D. C., with 33 telephones per 100 population. Then come Denver and Seattle, practically tied at 32. Stockholm, Sweden, and Los Angeles,

Calif., are only a fraction behind that mark.

Following, in the order designated, are Chicago, with 29.4 telephones per 100 people, Omaha, Toronto, Minneapolis, New York, Pittsburgh, Montreal, Oslo (Norway), Copenhagen (Denmark) and Zurich (Switzerland). Paris has 12.5 telephones per 100 people, and London has 8.7. The five large cities of Japan run between 4 and 6 telephones per 100 population. The largest city in China, Peiping, with 1,200,000 population, is given but 12,800 telephones, which is a trifle over one station to the 100.

* * * *

Telephone workers will be especially interested in the figures showing the distribution of telephones in large and small communities. In the United States in communities of 50,000 population and over, the records show there are 22.9 telephones per 100 people. In communities of less than 50,000 population there are 12.1 telephones.

Canada is the only country that approaches this telephone development in the small towns and rural districts, having 10.1 stations. All other countries, barring New Zealand, are far down the list.

This is significant as showing that in the United States and Canada there has been a much greater effort to bring telephone service to the farms and the small towns.

* * * *

The distribution of business and residence telephones in the United States roughly runs at a ratio of about one to two. January 1, 1930, there were 6,890,000 business telephones and 13,178,000 residence telephones. Scanning the list of states, it is revealed that business telephones are more numerous, proportionately, in the industrial states than in those where agricultural pursuits engage the attention of the people.

In New York, for instance, there are 1,333,000 business telephones and 1,611,000 residence stations. In Kansas there are 322,000 residence stations and 81,000 business stations. Florida is the only state reporting more business stations than residence telephones, the figures being 89,000 and 75,000, respectively.

The telephone statistics relating to American cities are arranged in three groups. In the first group are those where the population of the city or exchange area exceeds a million. There are eight of this class, and their average is 25.4 telephones per 100.

New York is given 1,811,410 stations, which is at the ratio of 25.3 telephones per 100 people. Chicago is rated at 987,891 telephones, or 29.4 stations per 100. Los Angeles, with 383,979 telephones, had 30.2 stations per 100 population.

In the second group, where the population of exchange area runs between 500,000 and 1,000,000, there are 10 cities whose average is 23.2 stations per 100. The four examples are as follows:

Pittsburgh, 229,135 telephones, or 23.5 stations per 100; Milwaukee, 155,209 telephones, or 21.0 stations per 100; San Francisco, 262,019 telephones, or 40.8 stations per 100, and Washington, 163,343 telephones, or 23.2 stations per 100.

In the third group of cities, whose exchange areas run from 200,000 to 500,000, there are 32 in the country, having in all 2,090,988 telephones, or 21.7 stations per 100 population. The examples of this class include: Minneapolis, with 131,907 telephones, or 27 stations per 100 people; Seattle, with 124,504 telephones, or 31.3 stations per 100; Denver, with 89,756 telephones, and the same ratio of 31.3 stations per 100; and Omaha, with 65,150 telephones, or 21.7 stations per 100.

* * * *

There are 50 cities in the United States with a population of 200,000 or more. They have 8,575,281 telephones in service, which for their combined population of 35,776,600 makes a ratio of 24 telephones per 100 people. Taken as a measuring stick for urban development, this figure will enable telephone men in the larger cities to determine how their company installations compare with others.

The average for smaller communities is less. In communities of 50,000 and over the ratio of telephones per 100 is 22.9, whereas in communities of less than 50,000 it is 12.1. These are for the United States. All other countries of the world show a much lower average for the smaller towns.

COMING CONVENTIONS.

Vermont Telephone Association, Rutland, June 16 and 17.

Canadian Western Counties Telephone Association, London, Ontario, June 23.

Northern Indiana Telephone District Association, South Shore Inn, Lake Wawasee, June 23, 24 and 25.

Independent Telephone Association of Washington, Elma, June 26 and 27.

Commercial and Plant Coordination

Coordination of Commercial and Plant Programs to Permit Selling Additional Service Without Incurring Prohibitive Plant Investment—Paper Read at Several State Conventions in Program Sponsored by United States Association

By Harry N. Faris,

Telephone Consultant and Technical Engineer, United Telephone Co., Abilene, Kans.

The history of wire communication is replete with proofs that commercial development is co-important with scientific progress. Perhaps no better illustration can be cited than one found in the archives of the Pennsylvania State Capitol at Harrisburg, which shows that plant and commercial activities were equally important from the very beginning, almost 90 years ago.

It is generally known that the first communication line of all time was the 45-mile telegraph circuit from Washington to Baltimore, completed in May, 1844. It also appears that the second wire project, and the first to be attempted without a government subsidy, was a single-wire telegraph line out of Harrisburg to Lancaster, Pa., which was intended also to reach Philadelphia and New York.

The same "experienced" gang that had built the successful line for Professor Morse and the government, was brought from Baltimore to Harrisburg and started toward New York. Like all good gangs, this one got a "kick" out of the job, for it is recorded that as the men worked, they sang:

Sink the poles, boys, firm and strong,
Short and close together.
Solder the joints of the mystic thong,
And let it stand forever.

Though they could have had but a few weeks' experience, it would be hard to epitomize the requirements of good and durable construction more completely than

in this "theme song." But the lesson for those inclined to overstress the importance of plant work is that this particular line never reached Philadelphia or New York, solely because of neglect of the commercial job.

The financial backers of the project assumed that having secured an experienced man to build the line, the public would flock to the offices to use it. But when the Harrisburg-Lancaster section had been completed and opened for a week, with average receipts of six cents per day at Lancaster and ten cents per day at Harrisburg, the financial backers became panicky; and instead of putting on a belated publicity campaign and a couple of "open houses," they had the line torn down and the material sold to reduce their losses.

Within a few years the line was rebuilt as a commercial necessity and as a part of the telegraph network that rapidly spread over the country. The telegraph is said to have received its real start from advertising received at the first national political convention, from which the candidates absented themselves and directed their campaigns by wire. This served as a demonstration to delegates from all parts of the country. It was for lack of publicity only that the pioneer commercial line had been dismantled as a financial failure.

Human nature has changed but little in the past century, and those of us charged with putting over new services must not assume the public will spontaneously catch our enthusiasm about the "mystic thong" we are erecting. In addition to perfecting each new service, we must educate the public to its value, or years of slow and stunted growth will be the sure result instead of the prompt success which the offering merits.

Telegraph Blunders in Telephony.

Though the incident cited was but the beginning of 60 years of like experiences, few profited by these examples. As I recall the formation of Independent companies during the 1898-1905 period, the various western states gave scant consideration to commercial matters. Even the rates for service were those charged somewhere else and their adequacy was merely presumed.

The managers were for the most part plant men, deeply interested in equipment development and plant methods. Outside of competitive areas the service was supposed to sell itself, and practically all commercial activities were turned over to the "bookkeeper" who was usually an accountant with individually-devised methods and who rarely possessed any bent toward sales or commercial activities.

Recognition of Commercial and Sales.

Nor were these conditions confined to small exchanges. The management of many large companies was vested in former plant men. The failure of several large organizations to do a proper job was due to their being headed by a "circuit-drawing president" rather than a broad and experienced business executive. In time, the functional organization was adopted by the larger companies with better attention to commercial matters, and at present even the smaller companies and individual ownerships are recognizing the importance of commercial and sales activities.

In this belated recognition of the importance of commercial and sales activities lurks a danger of swinging to the other extreme and slighting plant matters. So it

"To the Telephone Company," Says Mr. Faris, "Is left the Obligation of Educating Patrons to Their Real Service Needs, Both Individually and Collectively; and When a Higher Grade of Service Is Really Needed by the Entire Community, the Obligation to Inform Our Patrons Should Be Cheerfully Assumed."

is well to use care in not "over-selling" what we have to offer.

This does not mean that we should refrain from sales effort merely because our service is imperfect or because we lack distribution facilities in certain sections. Additional revenue being the one thing most needed for the correction of such deficiencies, every effort should be made to sell additional service; always stopping short of promising what we cannot satisfactorily deliver.

It is becoming more apparent that "satisfactory service" is a relative and flexible term. The public is not inclined to demand "super-service," requiring a "super" rate, when they are getting reasonably good service at a commensurate rate. This leaves to the telephone company the obligation of educating patrons to their real service needs, both individually and collectively; and when a higher grade of service is really needed by the entire community, the obligation to inform our patrons should be cheerfully assumed.

But the present discussion must be confined to such coordination of plant and commercial programs as will permit selling additional service in such manner that it will *stay sold*, and without incurring prohibitive plant investment.

This is an extremely broad subject and could not be covered in the time allotted were we to go into the peculiar problems of large city exchanges. As the companies operating such exchanges are amply able to work out all problems involved, this discussion, to bring the greatest good to the greatest number, will be limited to exchanges having less than 2,000 stations.

Development Check-up Distinguished From Prophetic Survey.

The first requisite for a special commercial campaign in such an exchange is to find out the location and nature of present undevelopment which will require plant facilities, and to compare it with the available surplus facilities. This requires a simple survey of existing conditions as distinguished from the more elaborate commercial survey which attempts to forecast the future for a long period. The latter type of survey is of extreme importance and should be made when existing facilities in a portion of the exchange have become exhausted and a considerable amount of long life cable work must be done.

A comparison of undevelopment with existing facilities can best be made with a pole or cable map, preferably scaled 200 feet per inch, while the business session usually requires an enlarged sketch which can be prepared by reference to fire insurance risk maps.

In both residence and business sections, all main line telephones should be located and classified as to individual and party-line service. It is also necessary to classify all non-telephone homes as to "fair to good" habitations, which may reasonably be expected to install service; and low class "shacks," which are not likely telephone prospects.

In so classifying frame residences, the absence or condition of paint is perhaps the best primary criterion. Old, unpainted "shacks" without telephone service are not likely to prove telephone prospects. This is true also of frame dwellings which, although painted at one time, have not been repainted in the last 15 or 20 years. When the paint condition is marginal, general external appearances will determine whether the home should be classed as a "shack" or as a fair condition residence which may be considered a telephone prospect.

In exchanges of 1,200 stations and less, most experienced troublemen, when asked to designate from the street which houses have telephones, will come within 3 per cent of instrument report totals on their first attempt and will readily correct the map to within 2 per cent of instrument report totals on conclusion of the count. In exchanges from 1,200 to 2,000 stations, experienced local troublemen will not miss instrument report totals over 4 per cent for individual line service and 6 per cent for party-line service and will readily cor-

rect the maps to half these percentages of error.

When such accuracy can be obtained, street inspection is sufficient for pre-campaign surveys, and from 900 to 1,200 stations per day can be marked, counted and reconciled to the instrument report.

Business districts in the larger towns should be canvassed on foot to get the exact number of families living over stores and to classify those without telephone service into likely or unlikely prospects, according to observed living conditions.

A survey of the business section will usually reveal few places without telephone service; but many of the better stores will be found to need additional lines and further extensions or wiring plan facilities.

The business places most likely to be without telephones are the ancient blacksmith shop, the harness repairman, and the shoe cobbler without machine equipment. If these are paying for nearby residence telephones, business service forced upon them by high-powered salesmanship will not be likely to "stick." Such sales efforts can be better spent on those able to retain the service.

In addition to marking locations of families and firms wholly without telephone service, it is necessary to show with distinctive markings all prospects for *additional* service.

There being so few business houses without telephone service, many prefer, for comparative purposes, to exclude business stations and strike a percentage of residences with telephones to total occupied residences; also to strike a similar percentage with non-telephone "shacks" excluded, for the more intelligent comparison of different classes of towns, and for the proper setting of main line quotas for special campaigns.

Proper Development "Yard Sticks."

As a further check on residence telephone development, the number of families receiving domestic service from water, lighting and gas meters should be compared with total residence telephones plus joint users. This will usually show a lower percentage of residence telephone development than of light and water usage, because telephone service, being intangible, is easier to "borrow" and calls for greater and more diplomatic sales efforts.

Extension development should be a separate study based, for comparative purposes, on the number of main line business and residence sets, taking pains not to distort comparative showings by the inclusion of hotel P. B. X. stations in small towns as extensions.

The completion of these simple studies affords an accurate picture of the development of any particular town. Such figures are more reliable for comparative purposes than are those based on total population.

Nationality and religion have so much influence on the size of families that the percentage of school children to total population will often vary from 14 per cent to 44 per cent—and it is manifestly impossible to sell telephone service to school children. Due to changing economic conditions, the size of families in many communities is decreasing at an unknown rate and constitutes one of the most difficult factors in 20-year studies of probable development.

Special Campaign Considerations.

With the method suggested, homes and businesses, without telephone or joint-user service, stand out on the map distinctly marked. Joint users should also be marked for the attempted sale of full service. All two-story, and the larger one-story and story-and-a-half houses should be marked as extension prospects, in addition to *all* homes in the finer residence districts.

Such a map makes it possible to "throw" subscriber and prospect cards by street numbers in advance of a special campaign and to transfer to the cards all essential information the canvassers should have.

In the case of towns too small for house numbers, the map itself may be cut up into sections and the names noted thereon by the resident troubleman, or the local grocer's delivery boy. In either case, the canvasser has advance information concerning the name and telephone facilities of each prospect, which is quite important for an effective interview.

It is sometimes advisable to reserve non-telephone users for experienced canvassers, especially successful with such prospects, and to let non-experienced canvassers confine their efforts to the sale of extension facilities and additional long distance usage. In this case, cards of non-telephone users should be pulled or their locations on sectional maps marked or circled as "special prospects."

From the plant distribution standpoint it is necessary to mark the location of all non-telephone users for check against existing surplus facilities. If a pole map has been used for the commercial survey, the cable facilities should be sketched thereon; while if a cable map has been used, pole lines beyond the cable limits should be added, thus affording a single combined cable and pole map showing complete distribution facilities.

Since it is possible to estimate probable sales in each section of town, the plant people can at once indicate "tight" sections where sales should be confined to party-line service, if available, and also sections where ample idle plant justifies the pushing of individual line sales.

The plant people should restrict the sale of individual line service only where necessary to avoid expensive and unwarranted replacements or additions, in advance of the useful life of present facilities. Where both individual and party-line service are available, sales tact will usually accomplish the selection of whichever service the company is best able to furnish.

The foregoing makes it necessary to discuss party lines as one of the most important subjects in connection with plant and commercial coordination. In all major changes involving cable distribution, it becomes necessary to determine our future attitude toward party-line service.

While four-party service has proved the financial salvation of many companies with limited cable facilities, this does not mean that a new cable plant should be engineered on a four-party basis. However, if there be any great probability of unexpected growth, it is well not to allow four-party service to become extinct and unavailable for possible expansion beyond the individual or two-party capacity of the cable plant we feel justified in presently providing.

This requires a careful study, as the retention of four-party service means considerable additional cost and complication of central office equipment, but, as it also provides for high-class eight or ten-party, full selective rural service, we should also weigh the possibility of such "de luxe" rural service becoming commercially desirable and our probable ability to sell it, at a suitable rate.

The Party-Line Question.

Where party-line service has been given heretofore, one should always hesitate to "burn the party-line bridge behind him" and engineer a rebuild on an individual line basis. Even in the case of a non-growing or "backsliding" community, where the new cable plant cannot be exhausted, there is still the possibility the town may so far recede that the individual line residence rate may become restrictive, making it possible to increase total net earnings by the quiet introduction of two-party service for those who cannot, or will not, pay the individual line rate.

In manual ringing exchanges it is, of course, possible to introduce code-ringing common battery city service; but as this is likely to conflict with the rural rate set-up, it is much better to keep alive the possibility of two-party selective service in all cases where conditions do not seem to warrant the continuance of, or provision for, four-party service.

In view of the growing popularity of automatic ringing, it should be noted that it is not necessary to reduce self-starting *automatic* ringing to key-started *machine* ringing in order to care for two-party service. All common battery boards, for towns such as we are considering, have ample multiple capacity, and the cheapest and best way of providing two-party service is to dedicate certain hundreds to second party service as is done in machine switching equipment.

Multiple jacks and cabling, without relays, are inexpensive and such cables should terminate on toll type, intermediate distributing frame blocks, on the main frame, for ready cross-connection to any working line. All that is necessary is to provide

"A" type main frames with an extra pair of clips at the protector and to use 21 quad instead of 21-pair cables for the short run to the relay rack. The junction between multiple and relay cables can then be made either at the relay rack or at the main frame, the latter point being preferable with small types of line and cut-off relays.

To arrange for the cross-connection of second party jacks increases the cost of individual line equipments by less than 40 cents; and whenever the need for two-party service appears, a second party can be added to any existing line by purchasing jacks and cables only, in units of 20 lines.

Experience with such installations proves it is really unnecessary to burden the equipment with a reverting busy test. The calling party is readily taught to ask for the other party as "428 on *this* line."

Reasons for Four-Party Unpopularity.

The general abandonment of four-party service during recent years has been due more to plant than to commercial considerations. The extreme complication of relay-equipped subscriber sets for superimposed ringing has rendered four-party selective unpopular with Bell plant people, while semi-selective service has never been popular from the commercial or traffic standpoints.

In the Independent field, the extremely high voltages of ratio frequency harmonic ringing equipment have made it unattractive from the plant standpoint, while progress in securing the substitution of *low voltage, non-ratio* frequencies has been discouragingly slow.

When the ratio frequency harmonic system was designed, some 30 years ago, superimposed tripping battery had never been thought of, and all cable then used by Independent companies was of double-wrap, high-breakdown construction. Under these conditions the designers did not hesitate to use 175 volts, for the 66⅔ cycle frequency.

With the rotary machines then used, such current had an instantaneous peak not exceeding 248 volts, but with the universal substitution of transformer-interrupter sets, operating from storage battery, the 66⅔ cycle open-circuit peak often reaches 277 volts; and with the universal practice of superimposing 48 volts for tripping purposes, the negative peak frequently reaches 325 volts. Modern hard-core, single-wrap cable was never intended to withstand such voltages and their continued use means excessive cable maintenance.

During the war period, the Bell System designed a 20 and 40-cycle, 80-volt harmonic ringing system which it was proposed to substitute for the semi-selective and superimposed systems, but the adoption of this excellent system was throttled by a prohibition that no conversions of less than 50,000 stations should be attempted.

There is absolutely no occasion for the continued use of ultra high voltage ringing systems. As early as 1909, two manufacturers had produced five-frequency, non-ratio systems using a maximum of 100 volts and with ringers capable of being rung with as low as 40 volts.

While the advantages of the low voltage system were apparent from the beginning, so many large operating companies and manufacturers were reluctant to adopt a different, though better system, that the old high-voltage ratio frequencies were continued. Many operating companies which have abandoned harmonic ringing would never have done so had they been familiar with the merits of the low-voltage, non-ratio system.*

Modern practice again shows a tendency to boost the voltage of the higher non-ratio frequencies to 135 volts, but this is wholly unnecessary as ringers rated at 135 volts will be found to operate perfectly on 750-ohm loops, from standard 100-volt ringing equipment.

With alternating current not exceeding 100 volts, it is entirely permissible to use 48 volts of superimposed tripping battery, although with high-wound, low-voltage, harmonic ringers a perfect job of tripping can be done with superimposed battery taken off at the 24-volt level.

Certain manufacturers in adding the 30-42 and 54-cycle non-ratio frequencies to their former harmonic offerings, have neglected to design a new 66-cycle, low-voltage ringer and have made their old 66⅔-cycle, high-voltage ringer common to both systems. Needless to say, this defeats the whole purpose of changing to the low-voltage system.

When these 150 and 175-volt ringers are required to operate on 100-volt transformers, disgust with low-voltage harmonic ringing grows apace, whereas the trouble is all due to lack of understanding of the modern low-voltage system which is deserving of much wider application than it has ever received. In fact, having attained to the respectable age of 22 years, the low-voltage non-interfering system is about to cast aside its small exchange modesty and assert its well-merited rights throughout the telephone field.*

Five-Frequency Four-Party Systems.

A feature of the five-frequency low-voltage system, in addition to its adaptability to ten-party rural or suburban lines, is that it permits a four-party system to be worked to its full capacity at all times, since there is still left a "spare" frequency for changes and shifts. Thus, regardless of intercepting facilities, it is impossible for an incoming tenant on a party line to be annoyed by calls for the former occupant.

On dial systems, where seasonal changes are numerous and a terminal per station is not provided, intercepting on party lines becomes a serious problem, but with a five-frequency, four-party system which prevents getting anyone not wanted, intercepting equipment becomes relatively unimportant.

The acquaintances of a shifted party-line subscriber think nothing of their inability to get him at the old number and after a few attempts will dial "Information." A suggestion from the installer to the newly-moved party to call up his friends and *give them his new telephone number,* as well as his new street address, will largely avoid all confusion due to absence or shortage of intercepting facilities.

With a regular four-frequency, four-party system, such flexibility is wholly lacking, unless three parties be made the maximum fill per line. In fact, some companies try to avoid placing more than three

*In support of these statements, Mr. Faris submitted an actual experience chart for an exchange with over 2,000 four-party telephones on loops up to 600 ohms. Only 23 cases per month were found that could possibly be construed as harmonic ringing trouble or an average interval of over seven years between bell trouble reports.

SOUND BUSINESS—PLUS.

The first essential in the policy of the telephone company is that its operations shall be sound from a financial point of view. Any other policy would soon prove disastrous from every standpoint.

Our policy also requires conducting the business in such a way that service shall be constantly improved, the welfare of employes properly promoted and the general interest of the communities we serve advanced. This is sound business PLUS.

The severest test of such a policy does not come in boom times, but in slack periods. During the past year, our business has been materially less than that for which we had built our organization and our plant. The results of the year's work are:

1. Telephone service has been measurably improved.

2. Very few employes have been laid off.

3. There have been no reductions in wage scales.

4. Construction work on new buildings and on other projects affecting not only our own men but workers outside our organization, has been undertaken wherever it could properly be done, in many cases where postponement was entirely possible from every standpoint except that of the welfare of the service and the community.

5. The efficiency of the organization has been increased.

6. The financial returns have fallen, but not to a degree inconsistent with sound business under all the conditions.

—Chester I. Barnard, President, the New Jersey Bell Telephone Co., in newspaper advertisements.

parties on a four-party line unless all are property owners, not likely to shift. The use of five frequencies for four-party service permits a higher percentage of fill of low calling rate patrons, not socially prominent, and the matter is one to which manual manufacturers might well give further consideration.

Extension Sets in Magneto Plants.

Having dwelt perhaps too long on the subject of party lines, the remaining discussion must be devoted to the peculiar problems of magneto exchanges in the sale of additional service.

Magneto plants are usually found to have a very low percentage of residence extension sets. In any special campaign a large number of magneto extensions can be sold, but, for lack of suitable equipment, it is very difficult to make magneto extensions *stay sold*. This is due mainly to confusion and false ringing when making outgoing calls.

No sensible housewife wants an uncoded party-line system in her home, and insists on being able to make "out" calls from the privacy of her room without bringing the maid or "hired girl" to the downstairs telephone. She is never sure whether the maid has really hung up or has merely "banged" the hook and is continuing to "get an earful."

In like manner it is highly disturbing to household harmony when the maid cannot make an out call without waking her mistress upstairs. The maid does not like to have her calls listened to, for the mistress is often less discreet concerning what she hears than is the maid.

This absurd but long-standing condition was immortalized by William Allen White in one of his "Six Best Bellers" entitled "A Certain Rich Man." He bases a domestic tragedy on a husband making an out call and forgetting the tell-tale ringing extension in his wife's room. Thousands of New Yorkers, where the scene was laid, were left to shudder at the chances they had been taking or to wonder what was meant. It simply meant that Emporia, Kans., still had a magneto system and that White was getting "farm-line service" on out calls, merely because he required an extension set.

While it is possible for the ingenious wire chief to silence both bells without resorting to pulsating-current generators or biased ringers, no manufacturer has ever given sufficient consideration to the problem to design a standard practice for avoiding bell ringing on out calls for magneto extensions. As a consequence, the service is lacking in popularity and is capable of producing just such tragedies as Author White has depicted.

Silent Out Calls Needed.

In this connection it should be noted that many manufacturers seem possessed of the idea that magneto telephones are used on code-ringing party lines only. Accordingly they send out three-bar telephones, used almost entirely on individual lines, so wired as to ring their own bells on out calls.

This absurd arrangement means that whenever an out call is made, people are brought from all parts of the home or store to answer a supposed incoming call; and after being thus "false alarmed" a few times, they neglect incoming calls in the belief that someone is making an outgoing call.

Any exchange having a large number of individual line telephones with "two-point" generators will do well to remove the tapper guards so patrons can hold the tapper when they desire to make silent outgoing calls.

Code-Ringing Telephones.

On code-ringing rural lines the telephone on out calls should certainly ring its own bell as a guide to proper code signals, but in many Independent plants we find *party-line* rural telephones silent on out calls, while three-bar, *individual-line* telephones *in town* ring their own bells. Not only this, but the rural telephones are subject to excessive trouble from oil-soaked contacts, wrongfully placed in the ringing circuit, to accomplish the silent ringing which is absolutely detrimental to rural service.

Wiring Plans for Magneto Exchanges.

A similar situation exists with respect to wiring plans, which are almost unknown in magneto exchanges. Nevertheless, most of the standard common-battery wiring plans offer a clear analogy for magneto conditions. The magneto plan is much simpler, since it is unnecessary to introduce the extreme complication of holding relays and all that is needed is the key equipment.

Some manufacturer, still interested in magneto equipment, might well standardize a series of magneto wiring plans for use with key equipment already available for common battery service.

These are but a few examples of possible improvements in magneto service which would increase its value to the user and produce sorely needed additional revenue for the operating company.

Magneto System Extensively Used.

Manufacturers 30 years ago were just as hostile to the magneto system, and just as confident of its early demise, as they are today. But since 86 per cent of all Independent exchanges in the United States is still using the magneto system, and this percentage has remained stationary for several years, we may just as well recognize that the magneto system has "a place in the sun" and that it is worthy of care and development in proportion to its extensive usage.

Meeting of the Northern Indiana Association at Lake Wawasee.

The Northern Indiana Telephone District Association's meeting is scheduled for June 23, 24 and 25 at the South Shore Inn (Syracuse P. O.), Lake Wawasee. This annual meeting is said to be second only to the state convention in point of attendance, program and pleasure.

The program committee for this meeting met with John Troyer, president of the association, at Elkhart, recently and tentatively arranged an excellent program.

On Tuesday evening, June 23, John W. McCardle, chairman of the Indiana Public Service Commission, will give an after-dinner address on "Government Ownership."

On Wednesday morning the operators will conduct a program of interest to everybody engaged in telephone business. In the afternoon, telephone men and women will hold separate meetings.

F. B. MacKinnon of Chicago, president of the United States Independent Telephone Association, will be the principal after-dinner speaker on Wednesday evening, following short talks by ten northern Indiana telephone pioneers.

This meeting will no doubt attract telephone people from all over the state and the association assures everyone that the event will be a business and pleasure delight for all who attend.

Bobby Jones, in Hollywood, Talks Daily Across the Continent.

Bobby Jones, in Hollywood, Calif., making his series of golf-instruction motion pictures, has a daily telephone conversation with his wife in Atlanta, Ga. The details of the progress of their infant daughter are said to predominate in the talks.

In refusing to appear in any features with a love interest, Bobby Jones is quoted as saying that the leading lady who interests him most is the tiny one several months old back in Atlanta. The telephone is enabling Bobby to father that love interest as well as could be expected over a distance of 2,100 miles.

Washington Convention to Be Held June 26 and 27 at Elma.

The Independent Telephone Association of Washington has announced that it will hold its annual convention at Elma, on June 26 and 27.

The association of which J. W. Baker, of 165 South Howard street, Spokane, is secretary-treasurer, extends a cordial invitation to telephone men and women all over the country to attend its annual convention.

Prices in the Metal Markets.

New York, June 1: Copper—Quiet; electrolytic, spot and future 8½c. Iron—Quiet; No. 2, f. o. b. eastern Pennsylvania, $16.00@17.00; Buffalo, $15.00@16.00; Alabama, $11.00@13.00. Tin—Quiet; spot and nearby, $22.40; future, $22.62. Lead—Steady; spot New York, 3.75c; East St. Louis, 3.60c. Zinc—Quiet; East St. Louis spot and future, 3.25c. Antimony—6.37c. Quicksilver—$102.00.

The Farmer and His Telephone

Telephone Affords Farmer Means of Distributing His Produce; Protection to Human Life, Livestock and Property—Indiana Farm Statistics—Need for Salesmanship—Address at Convention of the Indiana Telephone Association

By G. Don Sullivan,
Editor, Indiana Farmer's Guide, Huntington, Ind.

Farming in the United States in 1931 is unlike the same industry which existed 50 or even 15 years ago. Today, in farming, just as in any other business, the law of survival of the fittest predominates. There is no room in the agricultural program of today for the farmer who is not alive to his possibilities. There is no room for the man who fails to progress with the advancing tide of low cost production, rapid distribution and quick turnover.

Just as in the commercial world the formula for successful business has changed from high speed production to high speed distribution, so has the agricultural world come to look not so much to quantity production as to low cost production with advantageous distribution.

Telephone and Plow and Reaper.

In this age of power farming, where the tiller of the soil puts a price on his time, the telephone plays just as important a part in the farming program as the plow and the reaper. Due to the necessary isolation of the farmer as far as distance is concerned, he must have means of placing himself in a way to take advantage of the quick-changing market quotations upon which he must depend.

The farmer alone must depend on price for his produce quoted by an outside agency. He is not in a position to set his own price. Therefore, with this in mind, he must sell when the market is at its peak.

I previously stated that the telephone was just as important as the plow and the reaper; just as the plow and the reaper are the keystones of agricultural production, so the telephone is the keystone of agricultural distribution. More farm produce is sold through the media of the telephone than any other agency.

Here in Indiana this is more aptly true than in some other states. Indiana's agriculture is so widely diversified that the farmer does not depend on one single source of income but has divided interests among varying classifications.

According to the 1930 agricultural census, Indiana has 181,000 farms. Just as in any other business, a certain percentage of these farms must be considered, as the credit man would say, "poor risks." In other words, some farmers have not as yet taken the steps to make themselves as progressive as the times require. However, they must be included in any analysis that we make of the Indiana farm market.

Since 1920, we have seen a steady process of weeding out as far as the farmers are concerned. The poor farmer has been forced to abandon his work on the farm and seek employment in the city. It is true that a certain percentage of this abandonment includes men who were better than a poor farmer but, necessarily, fell by the wayside as a result of this law of survival of the fittest.

Within the last year or two, however, there has been something of a change in conditions and the pendulum of population movement has turned from the city to the farm. During the past two years the industrial depression with the resultant unemployment situation has turned out of work hundreds of thousands of men over the country. Some of these were men who left the farm during the war period of high wages and utopian working conditions to seek factory employment. These men, now out of jobs, are returning to their original mode of life.

No Reason for Discouragement.

No one should be discouraged about the ultimate outcome. We are passing through a transition period. Such periods are always difficult to understand because we are too close to events to see the direction in which they are moving or to discern the outline of developments which will characterize the new era.—Secretary of Treasury Andrew S. Mellon.

Something of this trend is shown in the government report which states that the movement from cities to farms in 1930 was the largest since 1924. Farm population increased last year for the first time in 10 years. The movement of 151,000 persons from farms in 1930 is the smallest since 1922 when the United States Census Bureau began to make estimates of farm population movement.

Here in Indiana the same condition exists. Just the other day I happened to be in a countyseat town and, in talking with the county agent, learned that every abandoned farm in the county had become repopulated. In my own county, new farm families have been tabulated since the first of the year.

Personally, I believe that this movement will continue for some time to come and this should mean a hopeful prospect for rural telephone business revival. It at least suggests possibilities to the rural telephone company owners which should justify the retention and upkeep of the rural telephone lines that have suffered during the past years as a result of the movement cityward.

Distribution Problem of the Farmer.

In elaborating on the distribution problem of the farmer, I would call particular attention to the possibilities of the use of the telephone in the marketing of the produce which comprises 77 per cent of the farm income of the state of Indiana. These classifications are swine, dairy, poultry, beef cattle and corn.

In at least two of these classifications—dairy and poultry—daily marketing is the rule rather than the exception. In the marketing of hogs and beef cattle, the market period takes place four and sometimes five times a year. In other words, in four out of five of the principal income-producing items for Indiana agriculture, there is almost a daily dependence on the telephone for adequate marketing.

We have roughly pictured the rural telephone market in Indiana. Let us now consider the possibilities that this market affords to the various operating companies in the state. As outlined briefly, there are 181,000 farms in the state of Indiana. There are in use today approximately 121,000 rural telephones. In other words, almost 67 per cent of Indiana's farmers are equipped with telephones.

On a comparative basis, with 534,000 telephones in use in the state as a whole, we find that there is about one in every five telephones in use in a farm home.

The Indiana telephone industry likewise contributes its share to the farmers' prosperity because connected with the telephone companies in the state of Indiana there are 386,000 persons who are daily consumers of the farmers' products. These 386,000 persons represent 19,545 central offices in the state.

Possibly, you will be interested in two recent surveys which were made by the Indiana Farmers' Guide with reference to the use of the telephone by farmers. Our first survey was made among 12 exchanges, serving 29 towns. All of these towns were what might be considered strictly rural centers, that is, under 500 population.

These 12 exchanges serve 12,000 subscribers or 1,000 subscribers for each exchange. The total population of the towns served by these exchanges was 41,803. In other words, only about 28 per cent of the total population of the towns served by

these telephone exchanges were telephone subscribers. On this basis there were 29 telephone subscribers per 100 population in these towns.

While no record could be obtained as to the number of local calls clearing through these various exchanges, we did find that on an average there were 2,085 calls per month per station or an average of 2.88 toll calls from each station in one month's time.

Taking into consideration the fact that this survey included rural telephones, it can be seen that there is need for salesmanship in the organization of the various operating companies. The fact that salesmanship is needed in all of the telephone companies is more forcefully borne out by another survey which we have just completed.

Traveling a distance of 46 miles on country roads through the central part of the state, 94 farmers were interviewed. Of these 94 farmers, it was found that 62 were telephone subscribers while 32 were not. In compliment to the telephone industry of the state of Indiana, of the 62 telephone users interviewed 61 stated that they were well pleased with their telephone service and considered their telephone an absolute necessity. There was only one dissenting voice, and this dissension was not so much on the type of service as telephone rates.

Of the 32 farm homes which did not have telephones we found that 12 did not have telephones because of the, as they termed it, excessive telephone rates. However, upon questioning we found that the telephone rate was only $1.50 per month and without question in the majority of these cases proper salesmanship could have eliminated this objection.

In the other 20 cases the reason given for not being a telephone subscriber was that they had never been convinced of the necessity for a telephone. These farmers knew in a general way the advantages afforded by a telephone in the house, yet it had never been impressed upon their minds in the convincing manner necessary and with the proper type of salesmanship to induce signing the contract.

Personally, I feel that the biggest need for increasing rural telephone use in the state of Indiana today is the induction of salesmanship into the various telephone organizations. This salesmanship should not be limited to the commercial organization but should include the operating divisions and the repairmen for, in the final analysis, it is this type of telephone worker who comes in closer contact with the farmer than any of the other divisions of the telephone companies.

Telephone for Market Quotations.

The selling points for rural telephone solicitation are obtainable on every hand. At this time I would analyze a few obtained from personal observations. Perhaps, the greatest advantage of a telephone to the farmer is in obtaining market quotations.

On first thought, possibly some would say—even those connected with the telephone industry—that the radio renders this service. However, we find that the farmers do not depend, except in a general way, on radio market quotations because of the fact that in the majority of cases these market quotations are based on prices from Chicago, Cincinnati, St. Louis or one of the other principal stock market centers and, as a general rule, the same prices do not apply in their own rural market. For that reason, even in addition to the radio market quotations, they must depend on telephone communication. This is particularly true so far as livestock is concerned.

You might be interested in knowing that in the Indianapolis stock yards 52 per cent of the total daily receipts are trucked in from adjoining rural centers, and in practically every one of these instances the solicitation and market quotations are given over the telephone. In many cases where farmers do not themselves have trucks, livestock buyers truck the stock to the Indianapolis market, having previously solicited the business by telephone.

Protection Phases of Telephone.

The second most important use for the telephone on the farm is in a general sense as a means of protection—protection for human life, lives of stock and protection for personal property. In each of these three classifications there is an unlimited use for the rural teelphone line.

The farmer, situated as he is out of touch with the urban centers where in the majority of cases physicians are located, in case of emergency must depend on telephone communication for the summoning of medical aid.

The same condition exists as far as medical attention for livestock is concerned. Practically every veterinarian is located in a town, which means that when livestock are taken ill the veterinarian must be summoned at once; and no argument is needed to convince anyone that the telephone is the quickest means for this summons.

Previously in this talk I referred to a survey which we made in 94 farm homes. In making this survey we found that on the farms where telephones were in use, thousands of dollars have been saved the farmer through the arrival of the veterinarian in time to save livestock, following a telephone call.

When we remember that, as we pointed out previously, the biggest part of the farm income in Indiana is derived from livestock of one sort or another, we can easily see how this can be true. As one farmer that we interviewed pointed out, the saving accomplished in the recovery of one head of livestock, due to the veterinarian's timely arrival, more than makes up for the cost of five years' expense for his telephone.

The third form of protection which the telephone affords the farmer is that of personal property. In Indiana the farm home has little or no police protection and the only means of safeguard that the farmers have for property which they have on their place is through the various county sheriffs and the assistance of neighbors who may apprehend thieves after a robbery.

Protection to Personal Property.

The farm home without a telephone offers ideal conditions under which the average farm thief operates because of the fact that even though the loss is discovered within a short time, there is very little chance of apprehending the culprit, due to the fact that his getaway is practically assured by the time the farmer can get out and summon aid. On the other hand, the telephone-equipped farm home offers one of the greatest obstacles to the rural thief.

At the Indiana Farmers Guide we maintain a detective service in which we furnish to farmers the services of a detective in tracing down rural thefts; and in more than 80 per cent of the cases reported to us the farm homes suffering the greatest loss are those without a telephone. Likewise, in over 75 per cent of cases where we have been successful in running down thieves and obtaining convictions, these arrests were made possible through the quick reporting of the crime to our offices by long distance telephone.

It is practically impossible to estimate definitely, but we are convinced that hundreds of thousands of dollars in farm property are saved every year due to telephone service making possible the apprehension of criminals.

Just as the farm home is without police protection, it is likewise lacking in protection in case of fire. Just the other day in Noble county, Indiana, a barn valued at approximately $6,000 was destroyed because of the fact that the farmer was not able to summon sufficient help to fight the blaze due to the fact that he did not have a telephone. The help which was available it was necessary to summon by sending a man in an automobile to the adjoining farm homes. Before the neighbors arrived, the blaze had made such headway that it was impossible to get it under control.

Telephone a Necessity on the Farm.

On the other hand, in Tipton county while we were making the survey referred to previously, we came in contact with a farmer who had saved not only a barn but his entire plant due to his ability to call in neighbors and extinguish a blaze which occurred in a straw stack adjoining a barn, the sparks from which had spread not only to the barn but to the house and implement shed.

These are only two specific instances, showing the difference in the protection afforded the farm home which is telephone equipped and the one which is not. There

are probably numberless other cases which bear out this illustration.

I could continue for many more minutes telling you of instances of how the telephone could be of service to the farm home but I think that these points illustrate beyond possibility of argument that the telephone is not only an advantage in the farm home but an absolute necessity.

I doubt very much if the average telephone company considers the farmer as a prospect for extension telephone service, yet above every other class of subscriber the farmer needs the services of extension telephones. The farmer's home is likewise his place of business and while the greater part of his work is done away from his house, yet with but very few exceptions the telephone is located in the house with no other means of communication to outlying parts of the farm plant.

On the dairy farm there should be a telephone in the milk houses; on the poultry farm there is possibility for extensions in the poultry house and for practically every farmer there is an opportunity for installing extensions in the barn.

The opportunities afforded by this particular type of service was forcibly brought to my mind recently when a certain farmer who operates a maple sugar camp during the spring months in connection with his practice of general farming had a telephone order for several hundred gallons of his syrup. But due to the fact that he was working in the sugar camp it was impossible to reach him until late in the evening and by that time the demand for the syrup had been filled through other sources. The loss which this particular farmer incurred through lack of telephone extension would have more than paid for the cost of his extension over a period of several years.

Today in Indiana we have seen a rapid development in the number of roadside markets placed on farms. These people depend entirely on urban trade and without question there should be means of establishing communication with their urban customers by telephone. Where these roadside market stands are built, in a great many cases they are permanent structures and extension telephones could be sold in many cases.

These points are brought to your attention merely for your consideration. Possibly, they are more idealistic than practical but, nevertheless, they indicate the opportunity that exists for the increase in rural telephone service. I firmly believe that if such development is to take place, there is going to be need for the induction into the various telephone organizations of a class of salesmanship that exists with industrial concerns.

Big Need for Salesmanship.

While it is true that the telephone is a utility and a necessity on the farm, in many cases the farmer is apt to consider it a luxury due to the fact that never having had the advantages of the telephone he does not miss it. It is going to be necessary for every member of each and every telephone operating company, and in particular the smaller companies, to acquaint themselves with the various points of a constructive selling story; and whenever the opportunity presents itself to pass the story on to potential customers.

If this program is followed out, I believe that we can very safely hope that in the next ten years we will find the farm home without a telephone as rare as the farm home without a plow.

Arkansas Annual Meeting

Future Viewed With Optimism by President S. A. Lane in Annual Address at Recent Convention of the Arkansas Telephone Association—Addresses and Discussions on Various Problems

S. A. Lane, of Little Rock, was re-elected president of the Arkansas Telephone Association for the third time at the association's annual convention held at the Arlington Hotel, Hot Springs, Ark., May 14, 15 and 16. Mr. Lane is president of the Western Arkansas Telephone Co., which has its headquarters in Paris, Ark. J. A. Wommack, of DeQueen, and R. E. Norris, of Berryville, were elected vice-presidents; Curtis Stout, of Stuttgart, was elected secretary, and Ernest Sowell, of Little Rock, was elected treasurer.

The newly-organized executive committee comprises the following members: W. J. Moore, Harrison; J. E. Armstrong, Russellville; W. E. Gosdin, Little Rock; W. M. Graham, Cotton Plant; Ernest Wommack, DeQueen, and E. B. Rhodes, Fordyce.

President Lane sounded an optimistic note in his annual address at the opening session of the convention, Thursday, May 14. Although the present depression, especially in Arkansas, which suffered materially because of the drought and bank failures, included telephone companies in those that felt the general slump in business, the future is bright, he declared.

"We are depressed but not down-hearted," asserted President Lane. "We can face the future with confidence. We have been floating on a wild wave of false prosperity. We have been spending more than we could afford. There was a revelry or orgy of stock manipulation. We got into the idea that fundamental principles of business were unnecessary and of no consequence, and that our business would get along without work."

The telephone business, he declared, is a good barometer of general conditions. A nation-wide readjustment is necessary, and that cannot be brought about in a day. It is imperative that every business man "get busy" and do his part in the plan of readjustment. The day has passed when business will be brought to the telephone or any other company on a silver platter.

Mr. Lane stressed the following essentials to a telephone company's successful operations: 1, giving the fullest measure of service; 2, maintaining plants up to high standards of efficiency; 3, keeping accurate records of the business of all exchanges; 4, keeping customers and employes satisfied; 5, cultivating the acquaintance of the company's subscribers.

Following the invocation by the Rev. Charles F. Collins, rector of St. Luke's Episcopal church, Mayor McLaughlin welcomed the visiting telephone men to the city of Little Rock. The response, on behalf of the association, was made by W. M. Graham, of Cotton Plant.

"Merchandising Telephone Service" was the subject of an address presented by E. N. Widen, of St. Louis, Mo., while E. B. Downie, of St. Louis, general counsel for the Southwestern Bell Telephone Co., discussed "The Value of Public Relations." R. W. Hedrick, of Jefferson City, secretary of the Missouri Telephone Association, conveyed greetings from his association to the telephone men of Arkansas.

At the Friday morning session, Lawrence Wilson, lieutenant governor of Arkansas, addressed the convention. He was followed by J. R. Campbell, state representative of Sevier county, who spoke on the "Taxation of Utilities."

F. B. MacKinnon, of Chicago, president of the United States Independent Telephone Association, addressed the convention on the subject, "Holding the Line," at the Friday morning session. General discussions on various problems concerning telephone company executives were led by Curtis Stout, Stuttgart; R. E. Norris, Berryville; Elmer Goslin, Little Rock; Ernest Wommack, DeQueen, and W. M. Graham, Cotton Plant.

H. W. Hubenthal, of Oklahoma City, engineer for the Oklahoma Utilities Association, presented the first address at the last day's meeting of the Arkansas convention, Saturday, May 16.

Speaking on "Our Mutual Interests," C. Hamilton Moses, of Little Rock, attorney for the Arkansas Power & Light Co., declared that the people do not realize the power they possess. They can elect members of courts and can make and unmake the constitution. The people are honest and fair. If the public has acquired a prejudice against corporations, it is due largely to misinformation, for which the utilities are in a large measure responsible.

The greatest sin the utilities have committed, declared Mr. Moses, is that of silence. They have not been telling their story. They have made some effort to tell their story through the establishment of a public relations department and

(*Please turn to page* 47.)

Here and There in Telephone Work

P. B. X. Current Supply; Charging the Storage Battery (Cont'd.)

By JOHN A. BRACKEN.

A grounded P. B. X. charging dynamo armature coil or commutator segment occurs where the insulation breaks down between the armature conductors or segment and the iron frame of the machine.

To test for a ground, clean the commutator and brush contacts, then connect a source of alternating current across the brush leads at opposite sides of the commutator, first opening the armature leads at the binding posts on the machine.

To avoid an excessive rush of current in the armature—also the blowing of fuses in the circuit—an incandescent lamp or suitable resistance should be connected in one side of the alternating current circuit; for instance, if a 110-volt current is used, insert a 110-volt lamp in series with one of the wires.

With a head receiver connected to two test points, Fig. 1, connect one of them to the armature shaft or to the frame of the machine, and with the other touch each segment of the commutator; the humming tone heard on each segment should be the same except on the one that is grounded. This segment will give off a tone that is weaker than the rest or probably no tone at all.

If alternating current is not available, direct current may be used and a low-reading voltmeter or a milliammeter substituted for the head receiver. An even deflection of the instrument needle on each segment will indicate a good coil, but a small deflection or no deflection of the needle at all will indicate a grounded coil.

If it is convenient to remove the armature from the machine, a test that is used in repair shops may be applied. Mount the armature on two wooden blocks, so that the armature can be turned by hand without rolling off. Now, using a 110-volt direct current, with a lamp or rheostat connected in series, connect one wire of the circuit to the armature shaft and with the other test each commutator segment.

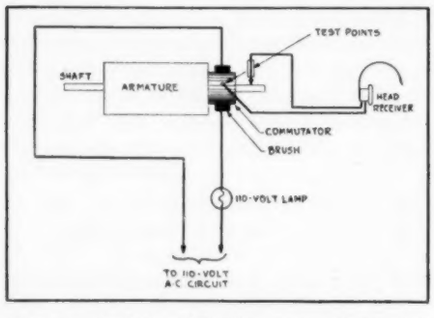


Fig. 1. Method of Testing for a Grounded Armature Coil.

As the segments are touched with the wire or pointer, as the case may be, feel the laminated iron magnetic poles on the surface of the armature with a small bar of iron or the face of a hammer. When a pole piece is reached that has no magnetism in it, then the copper wire coil surrounding, or the commutator segment on which the pointer is resting, is grounded.

To ascertain if the coil or segment is grounded, disconnect the coil lead wire at the segment, and again touch the commutator segment. If the lamp in the circuit burns, the segment is grounded; if not, the coil is grounded.

In order to produce sparkless commutation while charging a large P. B. X. storage battery, a type of direct current shunt generator, called an interpolar machine, may be used. Interpolar machines, as the name implies, are machines with extra magnetic poles placed between the main poles, Fig. 2. For instance, a machine with four poles will have four additional poles placed, one each in the space between the main poles.

The interpoles are smaller than the main poles and the windings on them are in series each with the other, and also in series with the armature; that is, the armature current flows through the winding on the interpoles before it reaches the charging circuit.

The use of the interpole is explained as follows:

As the coils on the generator armature pass out of the field under one main pole piece, and into the field of an adjacent main pole piece, the electric current induced in the coils is reversed; and as the commutator segment, to which these coils are connected, is at this moment passing under the commutator brush, the coils are also momentarily short-circuited.

The short-circuiting of the coils causes a heavy current of self-induction to flow in them; and this current tends to retard or oppose the proper reversal of the main current in the coils, which in turn causes heavy sparking at the brush contacts.

The interpole pieces are so placed, and the winding on them is in such a direction, as to create a magnetic field that will assist the reversal of current in the coils passing through the neutral point. The winding on the interpoles is placed as near the end of pole faces and as close to the armature surface as good mechanical construction will permit, in order that the magnetic field produced by this winding shall strongly oppose and compensate (an equivalent given in return) for the field produced by the armature coils.

The distortion (twist or turn from the natural shape or form) at the point of commutation, which would occur if there

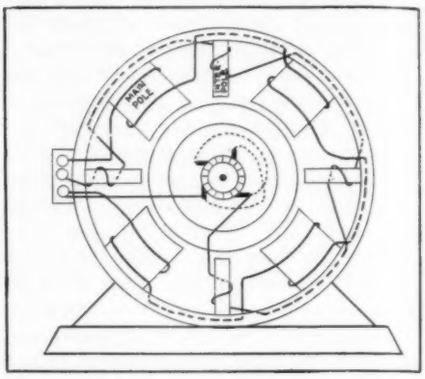


Fig. 2. Direct Current Shunt-Wound Battery-Charging Dynamo Showing Interpoles and Winding.

was no interpole winding, is in this way prevented by the field produced by the interpole winding; in addition, this field assists in reversing the current in the short-circuited armature coils under the brush. This magnetic field being always in proportion to the battery charging load, sparkless commutation is accomplished at all loads up to a very heavy overload.

California Highway Patrolmen Available by Telephone.

Motorists on California's highways desiring to communicate with patrolmen for the purpose of reporting accidents, intoxicated drivers, or other irregularities, will in future find this a simple matter, even when the offices of the squads in nearby cities are closed.

Under a new arrangement with the Pacific Telephone & Telegraph Co., all officers of the California highway patrol will keep in hourly touch with long distance operators.

The plan, as outlined by District Inspector Elmer Steinmeyer and Captain Jack Shryver, of the Sonoma county squad at Santa Rosa, requires the highway patrolmen to stop at checking stations at least once hourly and call the long distance operator, asking if any calls have been received. Officers will call at different times, thereby assuring the public that a patrolmen can be reached in a period of a few minutes.

If any unanswered calls are listed, the operator will immediately connect the calling party with the officer. In this manner the public will be kept in almost constant communication with state traffic officers, and in cases of accident or emergencies it will be possible to almost immediately locate an officer.

The plan will be in operation both night and day. Officers of the night patrol who find rural telephone stations closed at night

will be able to call from pay stations at convenient points.

Inspector Steinmeyer and Captain Shryver are at present organizing the "beats" patrolled by the Sonoma county squad, and checking stations from which calls are to be made are being listed for each officer and for traffic headquarters.

As rapidly as this can be accomplished, identical work is being carried on in each county in the state. As soon as the plan is put into effect and is proven satisfactory, maps marking the location of all checking stations will be prepared, and copies will be forwarded to the division of motor vehicles and the highway patrol offices at Sacramento.

Duplicates of the completed maps will be furnished every county traffic officer in the state, enabling officers to determine just where and when state highway patrolmen may be located in other counties, Inspector Steinmeyer said.

"I Wonder Why" of an Observing, Traveling Telephone Engineer.

By Ray Blain.

I wonder why it took manufacturers of cable so long to realize the advantages of metal reels for lead-covered cable?

With the old style wood reel it was standard practice to nail the lags in place and then bind with wire stapled in place or iron strap nailed down.

This method was never very satisfactory as the nails would soon ruin both the lags and the edges of the reel. Due to these defects, this method was later modified. The lags were cut out at the ends to fit down between the edges of the reel about an inch and then held in place with the metal strap drawn tight and clamped with a special tool.

With the older method it was generally standard practice to bind the lags in bundles of about ten each for shipment back to the manufacturer.

At best, the wood reel was cumbersome, heavy and of short life. Anyone who has ever tried to use cable from an old shaky, rotten reel will agree with me that they were not just all that they should have been.

There has lately been introduced an all-metal reel which makes use of wood lags clamped in place. This seems to be the ideal arrangement for carrying cable from the factory to the job. The spokes are of angle iron welded to a center hub. The two ends are held in place by ten large bolts in a manner similar to that used in the construction of wooden reels.

Heavy sheet metal forms the ends which are held in place by spot welding to the angle iron spokes. Sheet metal is also formed around the spokes to make a base for winding the cable. Metal box arrangements cover the ends of the cable which are securely clamped in place.

With this reel lags can either be bundled for return shipment, or replaced on the reel which is a simple operation. This metal reel appears to be entirely satisfactory and there is small doubt that the wood reel will soon be a thing of the past.

Telephone Industry Adds to New Tone Language.

The beginnings of what is really a new language in the form of special musical tones used in operating dial telephones and in other details of modern telephony are described by P. Husta of the Bell Telephone Laboratories in the privately-circulated Bell Laboratories Record of that institution.

The subscriber to a dial telephone hears when he takes down his receiver, Mr. Husta explains, a "dial tone" which really is a continuous musical note of a definite low pitch like the tone of an organ pipe.

Similarly, when a called line is busy, the caller hears another definite tone, consisting of a musical note of another pitch interrupted once a second. A third tone which dial subscribers have learned to recognize is the "ringing tone" which indicates that the called number is being rung by the automatic machinery.

Other examples of tone signals in modern telephony are the tones by which pay-station operators determine when the correct coins have been dropped, the "howler tone" used to attract the subscriber's attention when a receiver has been left off the hook, and other special tones used by the telephone employes themselves to test lines or to identify any line which is out of order.

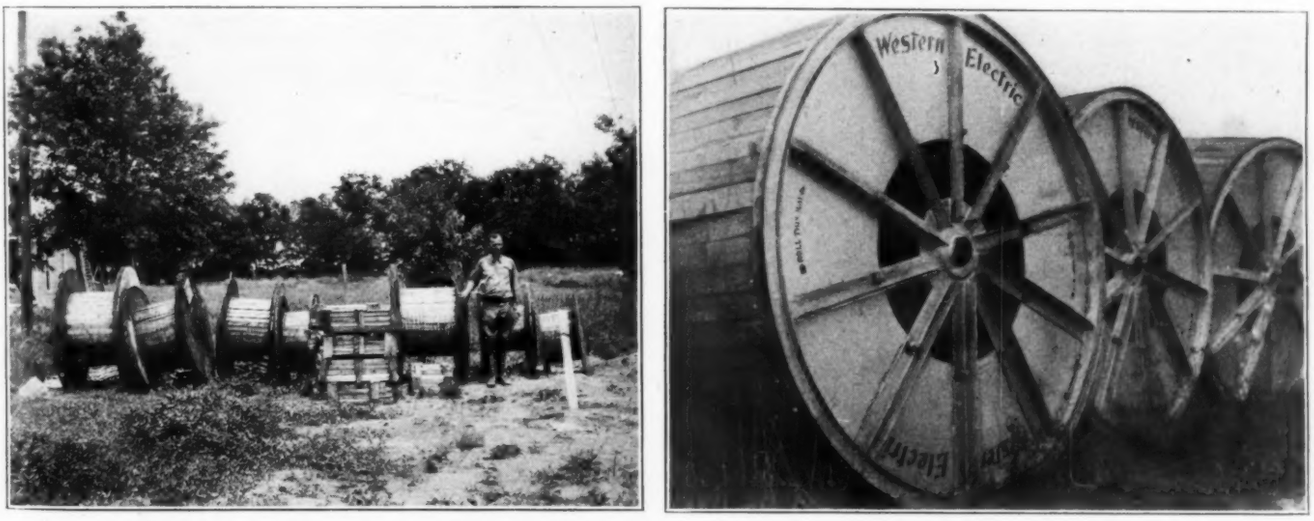
All these are like "words" in a new language, recognizable by people who know this language, just as words are recognizable. To these must be added many warning sounds now universally recognized, like automobile horns, locomotive whistles and the rings of telephone bells and of alarm clocks.

This new tone language is capable of almost indefinite expansion by new tones, just as ordinary languages are expanded by adding words made up of new combinations of vowels and consonants.

Coast Guard to Build Telephone Line in Michigan.

Plans for the construction of a $42,000 coast guard telephone line from Newberry to the Sault were announced recently by C. F. Geiss, of Sault Ste. Marie U. S. C. G., supervisor of communication for the Great Lakes division. Mr. Geiss said preliminary survey work would be done this year and construction of the 68 miles of private telephone which will link the Sault headquarters with Grand Marais, Whitefish and other points on the south shore, will start next year. The money will become available July 1, Mr. Geiss said.

The telephone line will follow US-2 from the Sault to Dafter, according to Mr. Geiss. From Dafter it will run west to M-28 and follow M-28 to Newberry. A telephone line from Newberry to Whitefish Point and Grand Marais is already in operation.



Wooden Cable Reels with Lags Bundled Ready for Shipment—New Metal Reels Loaded with Heavy Cable.

Chief Operators as Service Gleaners

Gleaning of Little Matters, Which Have a Bearing on Good Service, Important Part of Chief Operator's Work—Training Different Types of Operators—Some Operating Methods—Paper Presented at Annual Convention of Iowa Association

By Miss Ruth Foster,

Chief Operator, Appanoose County Telephone Co., Centerville, Iowa

Did you ever see the picture of The Gleaners? In this picture we see the women and children, who were called gleaners, at work in the fields. It was the custom in Biblical days for the gleaners to walk along behind those who cut the grain, glean it bit by bit and bind the day's gleanings into sheaves.

In the distance we can see the harvesters. Now let us liken our operators to these harvesters, their local and toll operating practices to the scythe and we as chief operators to the gleaners, because we really are "service gleaners."

We gather the tickets each day, put them through the process of observation, correction, sorting and binding them into mailing packets. We must observe every little detail of the ticket, especially the ones that have not been completed. We must notice each report carefully to see whether the operator has made every effort possible to complete each call.

Uncompleted calls mean dissatisfied customers. Although it is not always possible to complete every call that is filed, we must impress the fact on our operators that it is her subscriber's desire to talk on the call and her ambition should be to satisfy him.

Our operators are the ones who give the service to our patrons but our responsibility for giving good service to the public never ends. The word "service" is the fundamental of our responsibility. This responsibility begins the minute we accept the position, follows us from the office to our homes each night and back again each morning.

Although we have our evening chief operators who take up the work when we leave each evening, there is a feeling of responsibility that goes with us wherever we go. Haven't you at some time or another been some place where you heard someone using a telephone and you just felt that he was not satisfied with the service he was receiving.

We are away from the office, why should we be interested in the service he is getting? We are, because it is our company that is serving him and we do feel it our duty to find out the cause, if possible, thus eliminating its recurrence.

Before departing from the office each evening we should always make certain that we have enough operators on duty to handle the amount of traffic at that time of day; that we have called to the attention of the evening chief operator any unusual conditions in the office, such as taking peg counts, changes in the operator's schedule, new instructions, etc.; also that we have not left any unfinished work for the person in charge.

We, as chief operators, are always very much pleased to hear favorable comments on the service our operators give, therefore we are constantly on the watch for any indications of congestion or other conditions which might retard our operator or otherwise cause her to give poor service. On the other hand, we are just as interested in hearing the adverse criticism of our patrons. We make a note of each criticism of this kind; we analyze it to determine whether it is the fault of some particular operator, the force as a whole, or some negligence on the part of the company.

"The Gleaning of the Little Matters Seemingly Unimportant as to Detail," Says Miss Foster, "Are Very Important in a Day's Work Toward Giving Good Telephone Service."

We must make our service mean more than just answering, repeating and ringing numbers. We must try at all times to make people feel that we are glad to render a personal service in the most courteous, most efficient and quickest way. Good service should mean to an operator the serving of her subscriber in such a manner that she would be proud to have him know it was she who had served him.

When I really stop and think about telephone service it reminds me of a big wheel. Each operator is a spoke in the wheel of good service. If one spoke fails the wheel of good service ceases to operate.

We must consider in this wheel of service that we have many different types of girls, that each one has her own little peculiarities. It is very important that we make a study of each individual so that we can approach each one in a manner that will make her attentive and willing to carry out the work as we have instructed her.

In almost every office we find the type of girl who does not wish to be corrected and who resents any new instructions. We must be very tactful with a girl of this nature. We must make sure that we give a personal touch to our conversation with her; that is, talking to her in such a way that we make her feel we think she is quite willing to do the thing we want her to do.

Never tell her to do a thing; ask her to try the new method. After she has made a trial of it, ask her opinion of it, letting her express her ideas, telling why she thinks it isn't as good as the old way, if that be the case. This will appeal to her pride and give her a feeling of importance that will in almost every case win her over to your side.

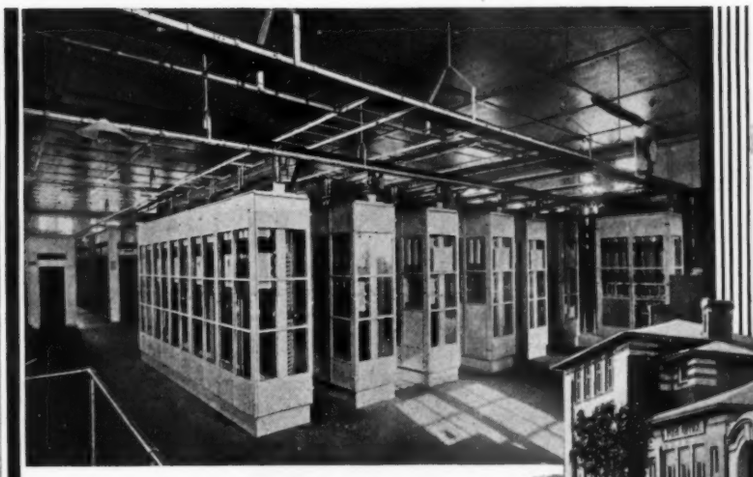
Next, let us consider the careless or indifferent girl, such as the operator who uses her job only as a bridge between graduation and marriage. We will have to be very preservant in training this type of girl.

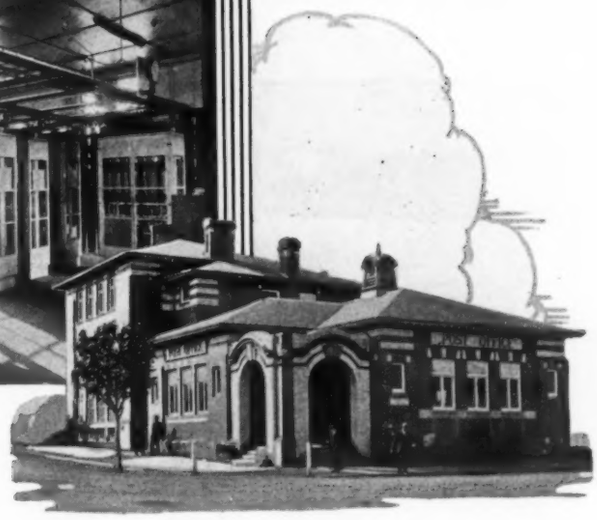
First, we must get her interested in her work and proud of any improvement. We might arouse her interest through peg counts of different nature. Taking these counts every hour and comparing hers with those of the other operators will create a desire to show what she can do. We might even, if she shows only this enthusiasm at the time the counts are taken, repeat them until we have incited in her a willingness to do her best at all times.

Another type is the nervous and rather timid girl. The most essential thing in this case is to put her at ease. This can be accomplished more easily by commending her for something she has done well, asking her how she is getting along and discussing her problems with her or by any little words of encouragement that will make her feel she is doing her very best.

However, the majority of our operators are girls who are very anxious to learn their faults and are equally anxious to cor-

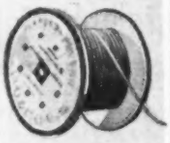
(*Please turn to page* 28.)

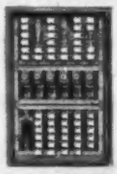




MELBOURNE, AUSTRALIA

Above: Malvern Exchange, Melbourne. At Right: Brighton Exchange, Melbourne. Strowger Dial Equipment as Made in the Strowger Factories at Chicago and Liverpool, Is Used in Many Other Large Cities in Australia.





Australia's Telephones Reflect Her Progress

AUSTRALIA'S rise to prosperity and world importance has been an accomplishment of the highest order. Nothing but persistent application of sound business principles and the adoption and use of modern inventions and developments could have achieved this notable result in such a comparatively short time.

Indicative of this nation's attitude toward modern methods, is her ready adoption and widespread use of the Strowger Dial System of telephony. With Sydney leading in the number of dial telephones in use (18 Strowger exchanges serving some 74,600 stations), many other important cities follow—among them Melbourne, Perth, Port Adelaide, Brisbane and Geelong. Such universal use throughout the Commonwealth is a tribute to the country's engineering leadership, which has encouraged the adoption of this modern equipment.

Telephone administrations everywhere are invited to submit their problems to the Strowger Staff. Proposals will be prepared without obligation—not only for Strowger Dial Systems, but for manual boards, cables, batteries, poles, or any item of telephone equipment whatever.

SUPPLIERS OF THE FOLLOWING PRODUCTS

STROWGER AUTOMATIC DIAL SYSTEMS

MANUAL TELEPHONE EQUIPMENT

ALTON STORAGE BATTERIES

PHILLIPS WIRES AND CABLES

ELECTRICAL MEASURING INSTRUMENTS

DRY BATTERIES

POLES

and other high quality products in the signal and communication field

THE AUTOMATIC ELECTRIC COMPANY, LTD.

CHICAGO, U. S. A. ANTWERP, BELGIUM

DIAL SYSTEMS · MANUAL SYSTEMS · TELEPHONES · WIRES

In Canada—Independent Sales and Engineering Company, Limited, Vancouver
In Australasia—Automatic Telephones, Limited, Sydney
In Japan—Automatic Telephones Limited of Japan, Tokyo
In China—Automatic Telephones of China Federal Inc., U. S. A.
In South Africa—Automatic Telephones (South Africa) Ltd., Johannesburg

PRIVATE SYSTEMS · CABLES · POLES · BATTERIES · SUPPLIES

When writing to Automatic Electric Co., Ltd., please mention TELEPHONY.

Through the Glass Partitions Can Be Seen the Strowger Automatic Dial Equipment at Main Office, Hilo. 1200 Lines of Equipment Were Placed in Service in This Office.

The Waiakea Unattended Dial Office. There Are 100 Lines of Dial Equipment Here, as Well as 100 Lines at the Unattended Kuhio Office. Both Offices Operate as Sub-Exchanges Into Main Office.

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STROWGER AUTOMATIC DIAL SYSTEMS

GENERAL EXPORT DISTRIBUTOR
The Automatic Electric Company, Ltd., Chicago
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In China · Automatic Telephones of China Federal Inc., U. S. A.
In South Africa · Automatic Telephones (South Africa) Ltd., Johannesbu

ROWGER DIAL HAWAII....

At Right: The Beautiful New Telephone Building at Hilo, Hawaii. Here is Located Main Office, Together with Commercial and Executive Quarters.

Below: Toll Room Showing Excellent Lighting and Ventilating Arrangements.

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Dial lo, Hawaii, the most
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Automatic Electric Inc.

Manufacturers of
Strowger Automatic Dial Telephone and Signaling Systems
ry and General Offices: 1033 West Van Buren St., Chicago, U.S.A.

ASSOCIATED COMPANIES
American Electric Company, Inc., Chicago
International Automatic Telephone Co., Ltd., London
Automatic Telephone Manufacturing Co., Ltd., Liverpool
The New Antwerp Telephone and Electrical Works, Antwerp
Eugene F. Phillips Electrical Works Limited, Montreal

When writing to Automatic Electric Inc., please mention TELEPHONY.

(*Concluded from page* 24.)

rect them. We will call these girls the willing or ambitious ones. We need only mention to them the fact that there is a new practice in effect, and they are not satisfied until they have the details and are allowed to put them into use.

Although we have these various types of operators, it is quite necessary that we have a definite method for performing the numerous operations which are necessary to complete a connection. Why not let each operator perform these different operations according to her own ideas? Sometimes an operator finds it more difficult to use the method she has been taught. Her own way seems so much easier. But there are many reasons why we cannot let each one operate in her own way.

Operating methods are continually changing. How can a chief operator teach one girl one method and another some other? There would have to be special rules with each change to suit the individual. If one operator is permitted to use her own ideas, we would have to give them all the same privilege. If this were permitted, we would have constant confusion and confusion means poor service.

The gleaning of the little matters seemingly unimportant as to detail are very important in a day's work toward giving good service. We shall liken these to our general observations.

First we might consider our operating room. It should be well lighted and properly ventilated. Our switchboard should be kept clean and free from all personal possessions. Above all things, we must see that the operating chairs are adjusted properly so that each girl can operate without feeling she is sitting in a strained position.

The operator's position at the switchboard reflects on her service almost as clearly as if she were visible to the subscribers. If she sits all bent over with her arms on the keyshelf or leaning on one elbow she is sure to display a lazy, disinterested tone of voice to her subscriber. However, if she is sitting erect, holding her cords properly and on the alert for a signal, her subscriber will know it because she has that cheery "I am ready to serve you" ring in her voice when she answers him.

Another very important feature is the operator's set. It should always be kept in perfect order. If the operator has to ask her subscriber to repeat his number several times because we have neglected to have her set repaired, we can feel that we have failed to cooperate with the operator in giving good service. On the other hand, if the subscriber cannot hear the operator he gets impatient, oftentimes hangs up and probably waits until he can see the party with whom he wishes to talk.

Every time we answer a signal on our switchboard the contact with our subscriber is either favorable or unfavorable. He is either a satisfied or dissatisfied customer. Each operator should have her own set. She should keep it wrapped and hung up with the horn turned down when it is not in use so that no dust or dirt will collect on the inside.

Proper adjustment of the set is very essential with the horn about half an inch from the lips. Speaking over the top or to one side of the horn will convey to the subscriber an attitude of inattentiveness, as he does not hear the operator clearly and distinctly.

Operators should by all means be taught the proper way of handling their plugs. They should grasp the shell of the plug, taking care not to push or pull on the cord. We know the cord is made up of very fine wires that are easily broken. This causes our connections to cut out, then our subscribers get disconnected and there is nothing quite so irritating to a subscriber as to be cut off after he has just started his conversation.

Courtesy is one characteristic that is oftentimes given very little consideration in proportion to its importance. Courtesy is not only something the public has a right to expect but it makes our work so much easier and encourages the use of the telephone. All operators who have their company's interest at heart will take pride in their ability to please their subscriber.

A short time ago one of the operators in our office answered a signal from one of our business telephones. There was a woman at the telephone who said she could find no one there and asked the operator if she could tell her where they had gone.

The operator said she did not know but told her if she would hang up for a minute she would ring the manager's residence, which was on the same line. She did and it was only a few seconds before she was getting the information she desired. She thanked the operator kindly and made her feel that she had done a great favor.

Now this is an unusual service because our operators do not have such information at the local positions; however, this particular operator is also a toll operator and has access to these telephone numbers. It does show how grateful our subscribers are for the extra effort we make to give good service.

Courtesy should never be sacrificed to gain speed, but we must cultivate speed in our operating. By speed in operating we do not mean hurrying through with our operations just to be rid of the subscriber, but we mean performing our operations systematically without any loss of time.

Mistakes are usually made through carelessness on the part of the operator and always result in a dissatisfied subscriber. Establishing a wrong connection not only aggravates the subscribers but it is wasted time on the part of the operator and an added expense to the company. Accuracy in telephone work, however, is not entirely dependent on the operator. Many times we are unjustly criticized for a mistake that a subscriber has unconsciously made and probably never realizes. It is cases of this kind that are hard for us to counteract, but by cultivating accuracy ourselves people will have so much less to contend with than if they had our mistakes and theirs also to endure.

Personal talks with operators are also very essential in order to give them a better understanding of the different operating practices they are asked to use and to give us an opportunity to discuss their problems with them, these oftentimes proving as helpful to us as to the operator. However, we have found in our office that a written opinion is more valuable.

We requested each of our operators to write a short paper on "What Makes Good Telephone Service." Although this was not compulsory each operator responded with a paper quite characteristic of her own operating. Various, yet very worthwhile ideas that we felt never would have been discussed with us otherwise were brought to our attention in this manner. They were not only interesting but very suggestive, as we felt they were based on actual experiences. In fact, I wish to give them credit for some of the ideas that I have expressed in these gleanings.

A Few Things a Good Workman Should Know.

A good workman must earn the respect of his supervisor not by words which do not produce results, but by diligence in the work assigned him.

He will remember that schools and colleges teach no man any particular business, but endeavor to help him to master his choice.

He will remember that he is a unit in the machine to manufacture and sell that commodity, and that cooperation without friction is what cuts the cost and causes a profit that will benefit his earnings.

He will remember that courtesy is but the Golden Rule, even in business.

He must not feel superior to another because his work is praised; he must always remember someone else could and can do a better job.

He should not be a grouch when his work is criticised, because to learn you do not travel the high road to success but the low road to experience.

To succeed, he must recognize his superior officer as his guide, because the best and the most economical practices have been given him, and to him his superiors look for the success of the enterprise.

He must remember that Safety Rules were made for his personal protection, and if not complied with injury may result to himself and others.—P. E. Patrick, cable testman, Chesapeake & Potomac Telephone Co., Norfolk, Va., in The Transmitter.

Hilo, Hawaii, Adopts Strowger

City in Hawaiian Group of Islands Installs 1,200 Lines of Strowger Automatic Equipment, with Two 100-Line Sub-Offices Operating in Conjunction with Main Exchange on Unattended Basis—Calls Doubled Under Dial Operation

By D. S. Guild,
Assistant Superintendent of Equipment, Mutual Telephone Co., Hawaii

To most people who have never visited any of the islands of the Hawaiian group, the words Hawaii and Honolulu are usually quite closely associated, so closely, indeed, that it is seldom realized that while Honolulu is the largest and most important city in the Hawaiian Islands, yet in the considerable area included in this group

The 100-Line Unattended Dial Exchange in the Waiakea Homestead District Operates in Conjunction with Main Exchange at Hilo, Hawaii.

there are several other cities whose population runs into the thousands.

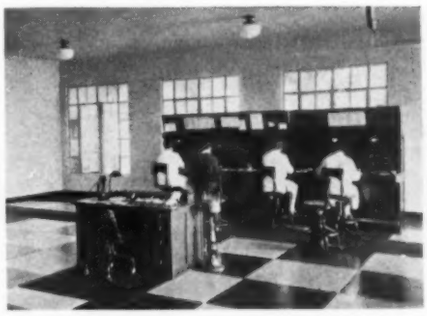
Among these other cities the largest is Hilo, situated on the island of Hawaii, Honolulu, incidentally, is situated on the island of Oahu. Hilo's population is approximately 15,000, and it is an active, progressive community—quite as modern in many respects as the most up-to-date American municipality. In fact, its increasing business and social activities made such good use of its telephonic facilities that in the last year or two it became apparent to the Mutual Telephone Co. that the city's system would have to be expanded.

The headquarters of the Mutual Telephone Co., of which J. A. Balch is president, are in Honolulu. Here Strowger automatic dial equipment has been in use for many years, giving complete satisfaction in a climate whose conditions of excessive humidity are equalled by few places on the globe.

The Mutual Telephone Co. keeps in strict touch with the latest and most satisfactory means that science offers for telephonic communication, and throughout the group of islands boasts one of the finest telephone systems in the world.

It is now completing plans for a complete inter-island system of radio-telephony to operate in conjunction with its already highly-perfected land plant, as well as a Coast-Hawaii radio-telephone service by means of which any telephone user in Hawaii will be enabled to talk with any other telephone user in the United States, Canada, Mexico, South American and other countries.

Since it was becoming increasingly obvious that the old magneto equipment at Hilo was inadequate to deal with the city's growing traffic, and with years of highly successful experience with dial operation in Honolulu as a background, the telephone company decided to install Strowger equipment at Hilo. The business men of that



Well-Lighted and Ventilated Toll Room of the Mutual Telephone Co. at Hilo, Hawaii.

city greeted this plan with cordiality; and since the cutover, which occurred recently, they have become even more enthusiastic over the high type of service which this modern equipment provides.

Statistical proof of this assertion is given in the figures submitted by L. W. Branch, manager at Hilo, which show that where the average number of completed calls per day used to be 4,000 with the magneto system, this has increased to an average of 8,000 completed calls per day under dial operation.

The telephone company officials feel that this kind of testimonial, as to the popularity of the improved facilities, is the most favorable commentary that it would be possible to receive.

The new telephone building at Hilo is one of unusual beauty, the type of architecture being chosen as particularly suitable for Hawaiian surroundings. Of two-

The Exterior of the Hilo Exchange Building of the Mutual Telephone Co. Is Characterized by a Decorative Motif in Keeping with the Architecture of the Hawaiian Islands—Beautifully-Decorated Customers' Room of the Hilo Exchange.

story construction, the structure has ample room for commercial offices, equipment rooms and long-distance facilities, as well as storage facilities for construction materials, etc. It is of fireproof materials throughout. Garage accommodations are provided in the rear for the company's cars and trucks.

The decorative motif, inset in the form of a pattern which adds beauty to the exterior of the building, is carried out in the public lobby by means of a painted decorative pattern on the ceiling beams, around the top of the walls and over the wide doorways leading into the various executive and commercial offices. The windows, which are of the French type, are very wide, providing an unusual amount of outside light and opening to give the high-ceilinged rooms ample ventilation.

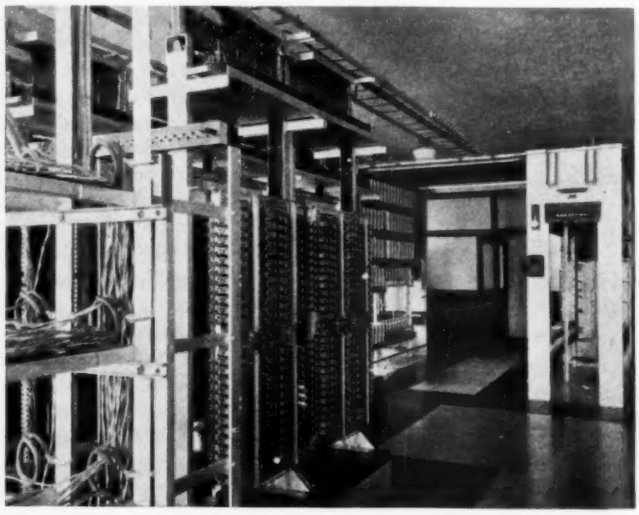
The initial installation of Strowger automatic dial equipment in the Main office on Kalakaua street consists of 1,200 lines of apparatus, and was installed under the direction of D. S. Guild. The line switches are of the self-aligning plunger type.

In addition to the central office equipment there are two sub-exchanges, unattended except for periodic inspections. The sub-exchange in the Kuhio Wharf district is designed for an ultimate of 600 lines, of which 100 lines have been installed at present. The sub-exchange in the Waiakea Homestead district consists of 100 lines of present equipment. Practically all telephones are on a straight, individual line basis.

The power required for the operation of the exchange is supplied by a storage battery located on the second floor of the exchange building. This battery is ordinarily charged from the commercial power supply, but an emergency gasoline engine generator has been provided to insure uninterrupted service in case the commercial power should fail.

A duplicate emergency-ringing generator set has been provided, which operates from the storage battery. By means of this ringing set, together with the emergency-charging set, service can be maintained independent of all sources of power outside the building for an indefinite period of time.

A three-section, six-position toll switchboard is installed on the second floor of the building, to provide service for long distance and rural calls. A toll and local test board have also been provided. An unusual feature of the toll switchboard is the night lighting arrangement, which consists of neon tubes extending the length of the switchboard. This lighting method has been found to be very satisfactory and at the same time quite economical.



General View of Automatic Switchroom of the Mutual Telephone Co., Hilo, Hawaii, Through Glass Partition on Second Floor—Close-up View of Strowger Automatic Equipment at Hilo.

New Long Distance Telephone Line Opened in Colombia, S. A.

The new long distance telephone line between the cities of Girardot and Armenia, connecting the Departments of Cundinamarca and Caldas, was put into operation on February 6, 1931. Service will be opened also between Bogota and Buenaventura.

The long distance lines will connect with the service already existing in Bogota and Cali, when completed, so that people living in those two cities can communicate from their homes or offices.

The line put into service on February 6 is the first in the country to be constructed on a technical basis. Telephone service in the city of Cali will be automatic within a short time, as the apparatus is adapted for such connection. The dials have already been installed.

"Birthplace" of Telephone in Boston, Mass., Torn Down.

The old Palace Theater building at 109 Court Street, Boston, Mass., sometimes called the birthplace of the telephone, has fallen before the wreckers and will give way to another and more modern structure.

In 1875 this was the site of the electrical shop of Charles Williams, Jr., and there was employed Thomas A. Watson, young electrician who was assigned to the job of helping Alexander Graham Bell in his experiments with the harmonic telegraph that eventually led to the invention of the telephone. There the first crude telephone instruments were made.

Bell and Watson carried on their experiments in the upper story of Williams' building where there was a wire connecting two rooms perhaps 60 feet apart looking out on Court Street. The building, of course, bore considerable romantic interest for that reason, but the plans that lurked in the back of Bell's mind for a telephone over which persons could talk were developed in theory elsewhere.

In 1926, members of Thomas Sherwin Chapter, Telephone Pioneers of America, placed a bronze tablet on the old Palace Theater, directly under the ticket window. This was recently removed and is now in safe-keeping. Thus an old landmark of the telephone and its earliest days passes.

Northwestern Bell Installs More Pay Stations in Iowa Town.

Six new public telephone pay stations, three with private booths, have been placed in Spencer, Iowa, by the Northwestern Bell Telephone Co.

The new booths are located in the Otto A. Bjornstad drug store at Main and Fourth streets, the Olympia Candy Kitchen on Main street, and the Johnson drug store at Main and Fifth streets.

Three new wall pay station telephones have been installed at the Standard Oil Co. stations on north and south Main street and at the Midcontinent Petroleum Co. station at Main and Railroad streets.

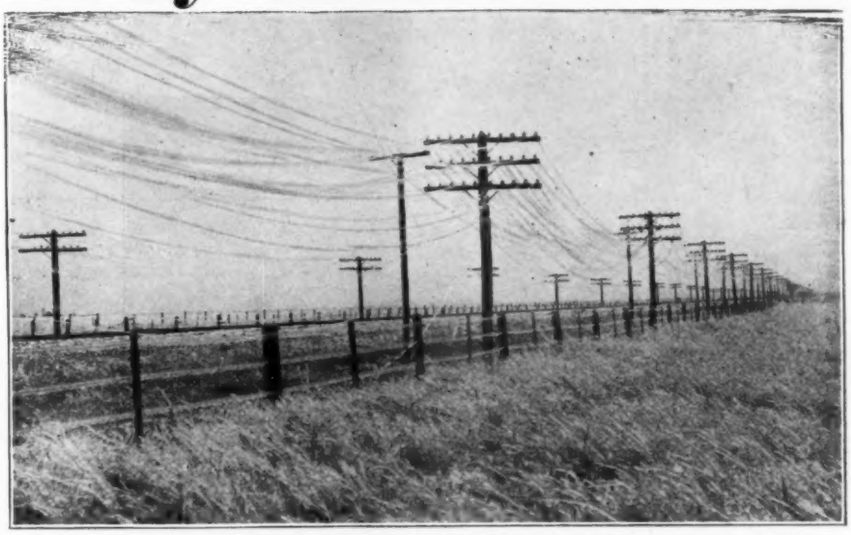
Other pay stations in Spencer are located at the telephone company's business office, the Tangney hotel, Seaton hotel, Holmes cafe, A. R. Austin service station, and the Molison service station.

Spencer has a population of about 5,000.

Why did this Pole Break?

Untreated Poles

Why didn't these?



Creosoted Poles

American Electric Company, Inc.,
64th and State Sts.,
Chicago, Ill.

Gentlemen: We are interested in knowing the cost in carload lots of Black Beauty Poles F.O.B..... in the following sizes:

Length	Top Diameter
.....ft.	.....in.
.....ft.	.....in.
.....ft.	.....in.

Name .....

Address .....

Fill out this coupon and you will receive full information at once with no obligation whatever.

Write for information on SLEET-PROOF "BLACK BEAUTY" POLES

American Electric Company, Inc.

Distributors of "Black Beauty" Poles and Cross Arms to the Independent Telephone Trade

State and 64th Streets : : Chicago, Ill.

Branch Office and Warehouse: 622 Wyandotte St., Kansas City, Mo.

When writing to American Electric Company, Inc., please mention TELEPHONY.

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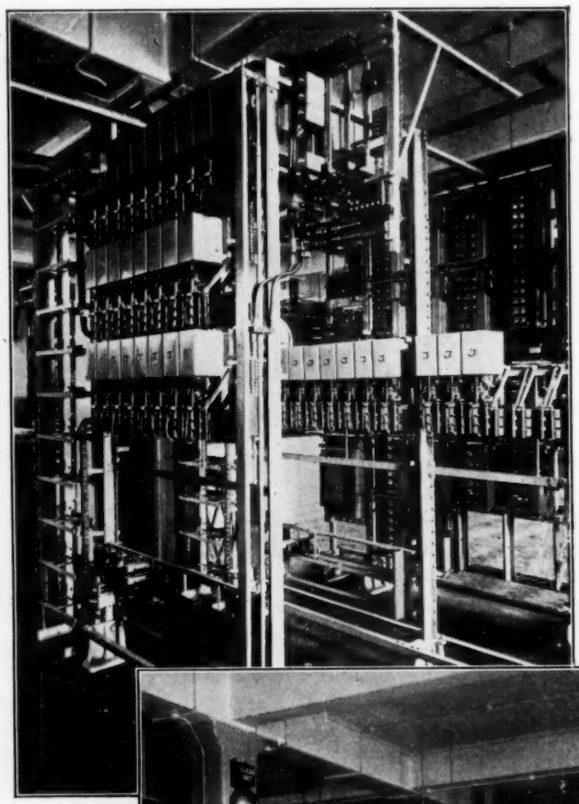

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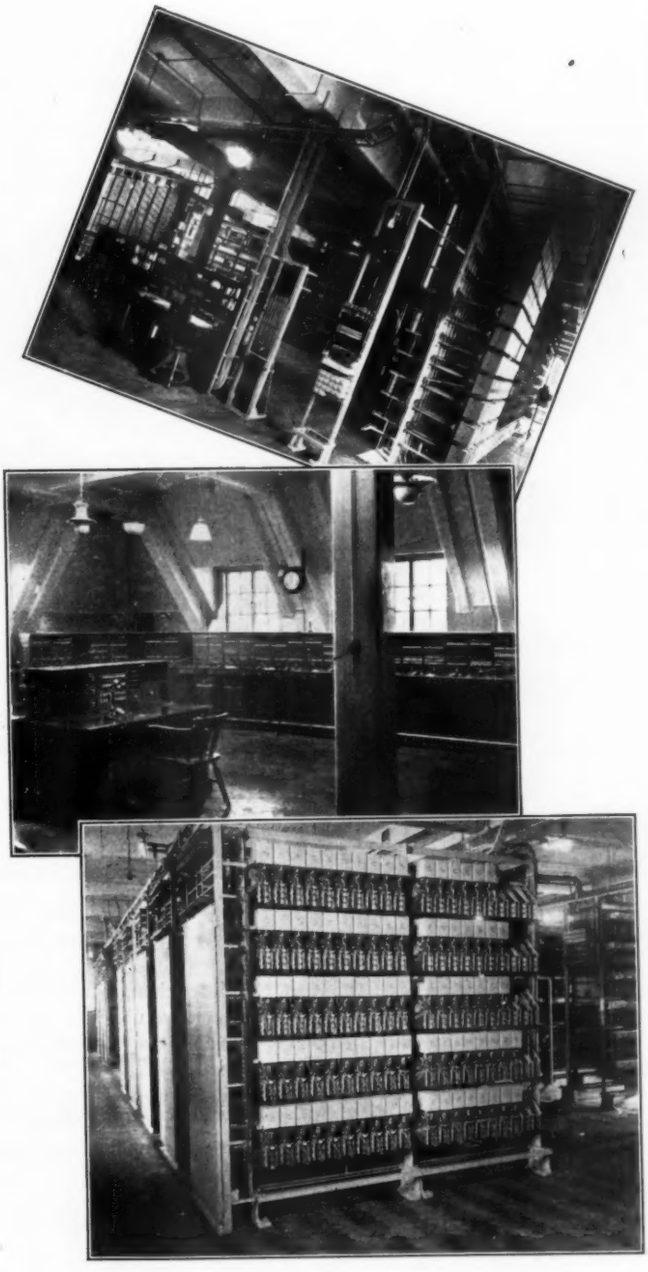

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TELEPHONES

How Inter-Mountain Carries On

Reasons Why Inter-Mountain Telephone Co., of Bristol, Tenn., Continues to Grow—First Responsibility to Subscribers—Employes Cooperate in Aggressive Sales Effort; Systematic Maintenance and Dependable Power Important Factors

By Allan L. Percy

The mountain region of Kentucky, Virginia, Tennessee and the Carolinas is said to be the last stronghold of original American stock. Most of the people living in this locality are members of families who settled there as pioneers in colonial times.

It was interesting to note, in some 700 miles of travel through the mountains of Virginia and Tennessee, how these people have triumphed over the mountainous nature of the country and other handicaps tending to restrict travel and free communication.

There are wide concrete roads, well-marked, and courteous filling station attendants who give full-measure gasoline and the kind of oil asked for, and warn motorists in a kindly way to take the second hill ahead in second gear.

There was found a land rich in second growth pine and other woods; farms of pure-bred stock fattening for market; high tension lines carrying power to clean, modern towns; pulp mills, rayon mills, paper mills, knitting mills, small but progressive factories providing an industrial backlog of diversified manufacturing.

W. N. McAnge, Jr., now president and general manager of the Inter-Mountain Telephone Co., saw all this and more one day, about seven years ago, in passing through Bristol, the city which straddles the Tennessee-Virginia state line. Mr. McAnge had just consummated a deal whereby the Allen properties in Mississippi became a part of the Southern Bell Telephone & Telegraph Co., but he had no intentions of retiring from the telephone business.

What he found in Bristol was a growing young telephone company resulting from the merger of certain local companies with parts of the old Cumberland and the Chesapeake & Potomac Bell companies. Numerous small Independent companies in the surrounding territory offered a fertile field for possible expansion.

So he purchased a controlling interest in the Inter-Mountain Telephone Co. and set out to build up a successful property, launching immediately upon a program of expansion and improvement which is not yet completed.

The Inter-Mountain company now furnishes service to 15,411 subscribers in 22 towns and cities. Of these, 13,301 enjoy common battery or automatic service.

Mr. McAnge feels that his first responsibility is not to stockholders, but to subscribers. So on every question of major importance which concerns service, the subscribers are consulted. For example, the subscribers in Chilhowie decided that they preferred the personal contact of manual service to dial telephones, so manual service was retained. In Gate City, Va., however, the subscribers preferred automatic telephones. Today they have them, although the Gate City exchange has only 86 stations.

W. N. McAnge, Jr., President of Inter-Mountain Company, Believes First Responsibility Is to the Subscriber, That Stockholders Will Then Be Cared for Automatically.

Most of the exchanges acquired by the Inter-Mountain were magneto-operated and wherever feasible they were changed to common battery operation. This in many instances necessitated an increase in rates. Subscribers were consulted before changes in equipment were made, and when the facts were presented to them no opposition was encountered. In Marion, Va., for instance, the number of subscribers almost doubled shortly after the common battery system was installed.

The Inter-Mountain company does more than try to please merely the majority of its subscribers; the minority, too, is given every possible consideration. A short time ago a universal switchboard was installed at Chilhowie, Va. All subscribers but four agreed to pay for common battery service. With the universal board the company was enabled to serve these magneto patrons as well as its common battery subscribers.

The Inter-Mountain company has some 350 men and women in its employ, every one of them a salesman. Yet, with the possible exception of A. U. Meadows, general commercial manager, there is not a full-time salesman on the payroll.

However, new business—including new subscriptions, extensions, P. B. X. installations, increased use of toll service, etc.—is sold, not merely waited for. This is indicated by a growth of 11.2 per cent in 1928, 12.5 per cent in 1929 and at the time this article is written a net increase for 1930 of 442 new stations. Toll calls increased nearly 40 per cent in 1929 over the preceding year.

The answer is that the Inter-Mountain company runs an almost continuous sales campaign in which every employe, from President McAnge down to the linemen and operators, take part. Each employe carries with him at all times a pad of contract blanks and uses them on every possible occasion.

Much of the actual selling is done outside of office hours. It is not uncommon for an operator, at a social affair, to sign up a new subscriber or secure an order for an extension telephone. Repairmen have often shown business executives how P. B. X. service would save them time and money. The saving of a cancellation also counts as a sale, so plant men, calling to remove instruments, have often persuaded subscribers to withdraw their cancellation order, thus saving a customer and saving the removal cost.

By tactful handling of rate disputes and "slow" accounts, the collection department has retained many stations and created no small amount of new business. In fact, J. L. Hashbarger, general collection supervisor, is pointed out as one of the Inter-Mountain's best salesmen.

As an incentive to sales work there are individual prizes for teams or divisions. At the present time the Virginia and Tennessee employes are arrayed against each other in a sales campaign. Every employe, of course, cannot be a star salesman. To give the "lame ducks" a chance, several employes who turned in contracts the preceding month are awarded checks for $5.

Much of the Inter-Mountain property is composed of acquired small companies with almost every conceivable kind of equipment. To keep this equipment operating, and to maintain a uniformly high quality of service, calls for considerable ingenuity on the part of the plant department. Eventually, of course, all equipment will be modern and standardized. This replacement work is going on as rapidly as

Keeping an eye on Millions of Dollars

THINK of the vast sums which have been collected on toll charges since 1894, when the first Calculagraph to serve American telephone companies began its work of counting up the minutes and excess minutes on the nation's toll boards. What a keen, watchful eye the Calculagraph must have kept on these millions of dollars, to serve so long and with such complete satisfaction.

The Calculagraph stamps on the toll ticket the beginning of each call together with the time elapsing during each call, down to the quarter of a minute, for any number of calls—producing a permanent and accurate record of each.

Prices and Information on Request.

THE CALCULAGRAPH COMPANY

50 Church St. Dept. 16 New York City

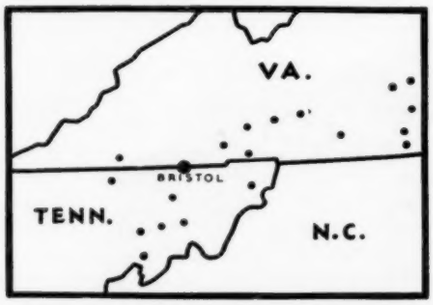
CALCULAGRAPH

THE ELAPSED TIME RECORDER

When writing to the Calculagraph Company, please mention TELEPHONY.

time will permit, but during the period of change-over old equipment must be carefully watched.

The plant department, therefore, makes it a rule to be on the job before trouble starts. Every telephone in the system is inspected at least once a year. This is carried out in a very systematic manner,



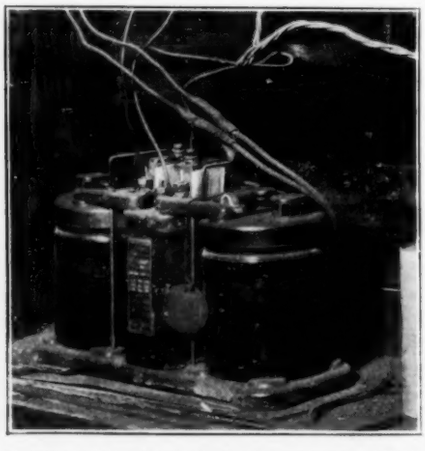
The Inter-Mountain Company Serves 22 Towns and Cities in Virginia and Tennessee, with a Total of 15,411 Subscribers.

a repairman following about a half hour behind the inspector, replacing any defective parts or making any necessary repairs.

Another thing which the Inter-Mountain watches very carefully is the power supply. P. B. X. batteries are "floated" continuously on Fansteel battery chargers of the electrolytic type, which method has been generally found more dependable and economical than attempting to charge them periodically from central offices.

In the floating battery system, the charging rate is carefully regulated by means of resistance units so that just enough charge is put into the battery to restore the power consumed, plus enough to compensate for battery losses. This is accomplished by taking readings with a voltmeter of known accuracy with the charger operating and the battery under an average normal load, and so adjusting the charging rate that the battery reads 2.15 volts per cell.

When an installation is first made, readings are taken daily to be sure that the voltage does not drop below 2.10 or rise above 2.20. Once this type of charger is adjusted, the battery remains in a healthy charged condition, regardless of the class of service under which it is operating, always affording a maximum reserve against possible failure of the alternating current supply.



Several Hours' Submersion in a Flood Failed to Damage This Battery Charger, Which Is Still Furnishing Power to a 175-Line P. B. X. in a Bristol Hotel.

The Inter-Mountain company has equipped all magneto switchboards with batteries charged in this manner, and pole-changers for ringing. The original cost and operating cost for this type of equipment are considerably below that of the usual motor-generator set, and the battery affords an emergency source of ringing current in case of power line failure—usually a time when telephone service is needed most.

The floating battery system is also being applied to some of the Inter-Mountain's common battery central office switchboards. In Johnson City an exchange of 3,606 stations, handling over 550 toll calls per day, the company charges its toll or auxiliary battery with a small three-ampere electrolytic charger. This system is working out with complete satisfaction, voltages remaining more uniform, batteries depositing less sediment and requiring less water, power costs and plant investment being substantially reduced.

That batteries last longer as a result of float charging seems beyond question. W. G. Griffin, general plant manager, tells of one very ancient and decrepit battery about to be discarded, which was put on float charge several months ago and is still operating efficiently. Any attempt to charge this battery with a high-rate rectifier or generator would have disintegrated the plates, he said.

The floating system of battery charging is both dependable and economical, according to Inter-Mountain plant men. Once installed and regulated, batteries and chargers require attention only about four times a year, which attention consists only of an inspection and the addition of distilled water.

C. H. Jennings, superintendent of maintenance, has made use of an idea which may be helpful to other maintenance men. Metal funnels often become corroded with battery acid or, through contact with foreign materials, contaminate the water being poured through them, carrying impurities into batteries or chargers. Glass funnels, of course, are difficult to carry around because of possible breakage.

Mr. Jennings, therefore, supplies his men with cone-shaped paper cups. Tearing off the point of the cone makes it an excellent funnel and it need be used only once.

Mr. Jennings also related an interesting story concerning an electrolytic battery charger, located in the basement of a Bristol hotel, furnishing power to a 175-line P. B. X. board. This charger was once totally submerged in a flood; yet when the waters had receded and the Inter-Mountain company's men arrived on the scene, they found the charger had resumed operations, much to their amazement. Fortunately the battery, higher in the cabinet, was not flooded.

The charger was rescued from the water, installed on a higher shelf, and put back into service, and like the proverbial Ford, it ran right along for 10 months more. Even then only the electrodes required replacement, and the charger is still giving satisfactory service.

The telephone instruments in the Inter-Mountain system were found to be remarkably free from line noises and battery charging hum. Visitors declare they have never listened over any telephone where

Cone-Shaped Paper Cups (with Tip Torn Out) Found to Be Excellent Funnels for Filling Batteries and Chargers, Preventing Contamination of Electrolyte.

articulation was so clear. This, it was learned, is due to the careful selection and frequent inspection of instruments, careful location of lines, use of full-size retardation coils and filter condensers, and choice of dependable batteries and charging equipment.

New York District Meeting Scheduled for June 11.

The Up-State Telephone Association of New York will hold a district meeting at Cazenovia on Thursday, June 11. Operators are urged to be present to learn new rules and methods in traffic work.

President J. G. Ihmsen, of Albany, says: "There never was a time more important than the present for telephone men to get together and plan for economies in operation, securing new subscribers and perfecting traffic practice, in order to offset possible loss, pending readjustment of business conditions."

2 plants, 70 miles apart. enjoy instant *written* communication by means of TELETYPE

TYPICAL of the many city-to-city Teletype installations which are earning extra profits for exchange owners is that of the Ohio Steel Foundry Company.

It connects their plant at Lima, Ohio, with another at Springfield, Ohio, some 70 miles away. Two Teletype machines are used and they provide the means for substantially all inter-plant communication.

Says Mr. D. R. Carpenter, secretary and treasurer of the company: "Operating two plants, with most of the management organization at one plant, requires a quick, sure means of communication. Through the Teletype, our two plants are managed practically as one.

"Orders are received at either plant and the portions intended for the other are Teletyped, frequently saving a day in deliveries. Intricate formulæ, analyses and specifications are exchanged between our chemical laboratories by Teletype, while our cost department also uses it for sending to the Springfield plant working foundations for costs.

"On Saturday mornings, during the salesmen's weekly meetings held simultaneously in both cities, the teletypewriter circuit is kept busy exchanging information, instructions and suggestions. Executives frequently hold 'conversations' by Teletype, and each executive has a typed record of the conversation.

"Although the teletypewriter circuit is busy 4 to 5 hours daily, it does not require a full-time operator at either end. It more than pays for itself by quicker deliveries, saving of traveling, and closer contact between executive and sales organization."

Possibly one of your local manufacturers, with a distant factory or warehouse, would welcome Teletype service. Why not investigate the opportunities your town affords for the leasing of this remarkable machine that sends typewriting over telephone wires? For further information write the Teletype Corporation, 1400 Wrightwood Ave., Chicago, U. S. A.

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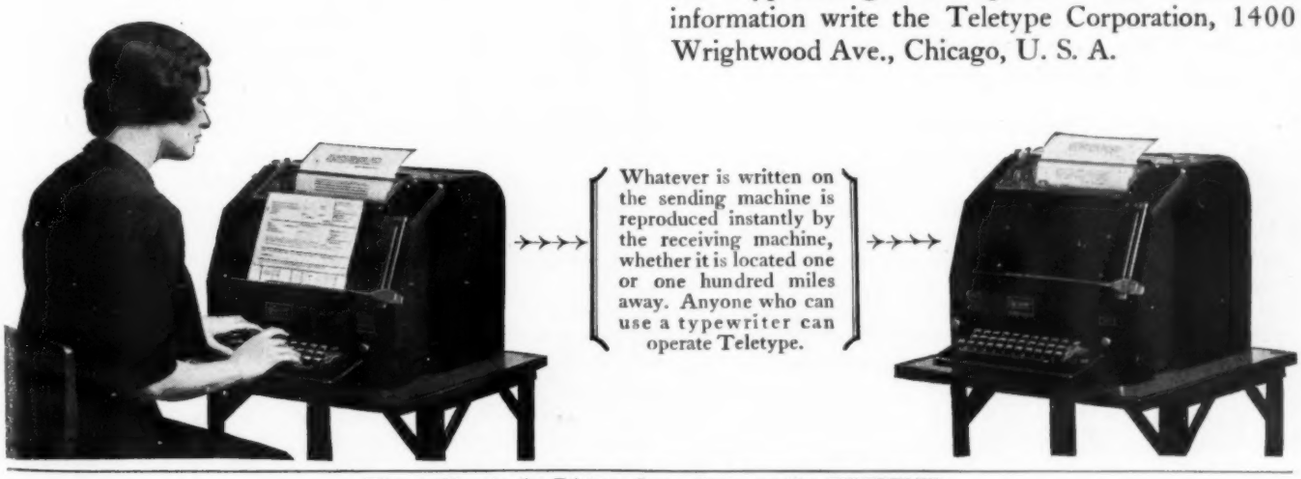
Whatever is written on the sending machine is reproduced instantly by the receiving machine, whether it is located one or one hundred miles away. Anyone who can use a typewriter can operate Teletype.

When writing to the Teletype Corp., please mention TELEPHONY.

What the Commissions Are Doing

Up-to-the-Minute News Regarding the Activities of State and Interstate Commissions, Courts and City Councils in Matters Concerning Telephone Companies—Summary of Commission Orders and Schedule of Telephone Hearings

Demands Illinois Bell Pay Four Millions Back Compensation.

An immediate demand upon the Illinois Bell Telephone Co. for the payment to the city of Chicago of approximately $4,267,000 back compensation which has accumulated since the company's old franchise with the city expired in January, 1929, will be made, in harmony with a decision reached at a meeting of the city council committee on gas, oil and electricity on June 1.

After the meeting Ald. Barnet Hodes, chairman of the subcommittee appointed to this task, made arrangements to meet with officials of the telephone company on Wednesday, June 3, to discuss the payment of compensation.

The proposed franchise was passed by the city council last July, and after being vetoed was sent back to the committee. On its passage nine votes were registered against the measure after seven hours of debate. Six of the aldermen who voted against it are still members of the council, and two of them are members of the committee.

Ald. Thomas J. O'Grady at the meeting of the committee on gas, oil and electricity, on June 1, was considering the submission of amendments that will give the city greater benefits than now proposed in return for granting the telephone company the use of city streets and alleys. Several disputed sections have been rewritten by Ald. Jacob M. Arvey, committee chairman, but while they change the wording, the sections are said to retain the old meaning.

In its old franchise, which expired in January, 1929, the company was definitely obliged to pay the cost of removing its properties to make way for subway construction. This is omitted in the proposed franchise, and in substitution provision was made that the company would be a party to any agreement between the city and the Insull companies relative to the payment of relocation costs.

By omitting the definite obligation as imposed in the old franchise the committee disregarded the advice of its then attorneys, Benjamin F. Goldstein and George I. Haight.

Another disputed point was the division of long distance toll revenue between the Illinois Bell and its parent organization, the American Telephone & Telegraph Co. and how much the latter should pay for the use of the Illinois Bell's local equipment.

As the city collects 3 per cent on the gross revenue of the Illinois Bell as compensation, the proper division of the tolls is considered by the aldermen as an important factor in the negotiations.

Under the old franchise the city received as a part of its compensation free telephone service, which it has been estimated would have cost the city $200,000 a year. This free service is abolished in the proposed ordinance, and under the proposed ordinance the city would be made to pay the $27,000 annual upkeep of the city telephone complaint bureau. Formerly, the bureau's expenses were paid by the company.

Ohio Bell Rate Case Hearing Indefinitely Postponed.

Indefinite postponement of its hearing relative to the Ohio Bell Telephone Co. rate case, was announced on May 26 by the Ohio Public Utilities Commission. The postponement was at the request of Attorney General Gilbert Bettman because of the illness of Assistant Attorney General Thomas Herbert, who is special counsel for the commission.

The commission was to have started a three-day public hearing on May 26 concerning the protests of the state, as registered by the attorney general, and of the company from the tentative valuation, approximating $104,000,000, placed by the commission some months ago upon the company's properties for rate-making purposes.

On behalf of the state and various communities served by the company, the attorney general is seeking a lower valuation than that announced by the commission. The attorneys for the company, on the other hand, are asking for a higher valuation.

Wisconsin Mayors Ask State-Wide Investigation of Rates.

Request for a state-wide investigation of telephone rates was filed with the Wisconsin Railroad Commission on May 12 by a special committee of municipal officials, including Mayor Daniel W. Hoan, Milwaukee; Mayor William J. Swoboda, Racine; Mayor A. G. Schmedeman, Madison; Councilman Meyer M. Cohen, Green Bay; City Attorney L. E. Lurvey, Fond du Lac; Alderman James Pederson, Marinette, and City Attorney E. A. Clifford, Juneau.

The petition raises the question of valuation of property in view of the decline in the price level and introduction of labor-saving devices; the reasonableness of the rate of return as compared to other industries not enjoying a monopoly; whether holding company payments are excessive and whether proper depreciation and obsolescence policies have been followed by the companies.

The committee contends it is undesirable for each city to fight its war for lower rates and urges that all cities combine in the move. The committee will work with the League of Wisconsin Municipalities.

On May 7 the state senate adopted, by a vote of 17 to 12, the resolution of Senator Walter Polakowski, of South Milwaukee, providing for an investigation of telephone rates in Milwaukee but recalled the resolution the following day and returned it to the committee for further investigation.

Removal Sought of Pennsylvania Public Service Commissioners.

Declaring that the Public Service Commission of Pennsylvania has lost the confidence of the people, that it has been negligent in its duties, indifferent in its stewardship and a menace to proper utility regulation, the final report of the house utility investigating committee, submitted to the house of the state legislature on May 25, urged that the members of the commission be immediately removed from office.

The report, submitted by Chairman D. Glenn Moore and signed by five of the seven members of the committee, was accompanied by an exhaustive review of the testimony prepared by Harold Evans, counsel for the committee and a former public service commissioner.

The committee urged the legislature to pass the Howell bill (S. B. 259) with a house amendment giving the governor the power to oust members of the commission without consulting the senate, and declared the utilities had been permitted to enjoy incomes far exceeding a fair return on their capital investment.

The committee asserts evidence has disclosed that the reports of utilities to the commission showed that the electric companies earned in excess of 7 per cent on $31,864,414 of invested fixed capital in plant and property during 1930.

It reaffirms its recommendations relating to legislation controlling holding companies. All of the utility representatives appearing before the commission, who were questioned, admitted that legislation giving the commission control over security issues and holding companies would materially assist and improve regulation. They stated that they had no objections to such legislation.

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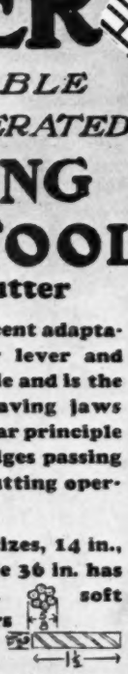
The Shear Cutter

This is the most recent adaptation of the Porter lever and toggle joint principle and is the first Porter tool having jaws operating on the shear principle with the cutting edges passing each other in the cutting operation.

It is made in three sizes, 14 in., 24 in. and 36 in. The 36 in. has a capacity of 5-8 in. soft wire rope or flat bars 1 1-2 in. x 9-32 in.



In cutting wire rope the Shear Cutter severs every strand and leaves no uncut or ragged edges. On flat stock the cut is clean and the edge of material is not unduly twisted or distorted. The Shear Cutter is rapidly gaining recognition as a valuable time saver in many industries as well as an emergency tool for airports. It has the cutting capacity of a bench or power tool plus portability. It is used extensively in wire rope plants and has been found to meet a long felt want in elevator and hoist installation work where wire cable is used. Telephone and power companies are using this tool with great satisfaction on guy wire and it promises to be one of the most popular models ever brought out by this company.

The Porter line of portable cutting tools includes Bolt Clippers, Chain Cutters, Nut Splitters, Shear Cutters, Wire Cutters, etc. in a number of sizes and models. Write for folder illustrating and describing the Porter line.

Sold by leading jobbers.

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Business Telephone Batteries too, are known the world over for their dependability—ready to give instant and intermittent service over a long period of time.

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The committee reaffirms its recommendations regarding legislation to permit the commission to award reparations in the same hearing wherein they find that existing rates have been unjust and unreasonable or discriminatory. It reaffirms its preliminary findings on legislation dealing with the assessment of cost.

The committee is of the opinion that the appropriation to the public service commission should be substantially increased in order to permit the commission to employ sufficient personnel to conduct investigations and examinations, to provide for necessary research to fulfill its responsibility of actively protecting the people's interests.

It reaffirms its preliminary findings that legislation should be enacted prohibiting an increase in rates until after the proposed increase has been approved by the public service commission.

The committee recommends that legislation be enacted permitting the governor of the commonwealth to appoint and remove all members of the commission. The advantages and disadvantages of giving the governor power of appointment and removal has been very carefully studied and analyzed and it is the consensus of opinion of the committee that this is the only feasible solution to this problem.

The committee reaffirms its preliminary recommendation that appellants in cases from the public service commission should be permitted to print only those parts of the record that pertain to their appeal.

The committee reaffirms its recommendations regarding the annual reports of the public utilities to the public service commission. It reaffirms its belief in the net investment theory and recommends its adoption in Pennsylvania as a standard for rate base determination.

The committee's recommendations for legislation regarding net investment are contained in house bill No. 1632, as amended in the judiciary general committee of the senate. Net investment, as stated in the amendment to Bill No. 1632, has been approved by many of the executives of the largest utility interests in Pennsylvania.

In conclusion, the committee urges legislation to take immediate steps to remedy the present situation. The Howell bill, being senate bill No. 259, as amended in the house, contains sufficient legislation to remove many of the existing faults. The passage of this bill will be the first step toward proper utility control. The committee, therefore, urges that senate bill No. 259, amended in the house committee, be immediately enacted into law.

To Reduce Rates in 18 Massachusetts Communities.

The New England Telephone & Telegraph Co., in conference with members of the Massachusetts Department of Public Utilities, has agreed to reduce its rates from 10 to five cents per call in 188 communities in the state including New Bedford outskirts, Freetown, Cuttyhunk, Dartmouth, Westport, Truro, Nantucket, Russell, Warwick, Royalston, Philipston, Monterey, New Marlboro, Sheffield, Ipswich, Southboro and Rowe.

In these communities certain calls within a restricted area for which 10 cents is being charged will henceforth cost only five cents.

It is stated that these reductions will be made as quickly as is consistent with conditions in each community.

Commission's Powers Increased by Wisconsin Senate Bill.

The Wisconsin state senate has recently passed a bill (S. 353) granting the state railroad commission greater regulatory powers over public utilities. The vote was 20 to 1 and the measure was sent to the assembly for consideration.

The bill gives to the commission greater control over depreciation reserves of utilities and provides an increased appropriation for employment of additional statisticians in the commission.

A provision of the bill requiring holding companies to be Wisconsin residents was amended to provide that only a majority of them must be located in the state.

DeForest Victor in General Electric Radio Tube Suit.

The DeForest Radio Co., on May 25, won a legal victory of vast importance to the radio industry when the United States Supreme Court held invalid the Langmuir tube patent of the General Electric Co.

The decision, according to contentions of the DeForest company attorneys, means that independent radio manufacturers are freed from the possibility of paying huge royalties until 1942 to the General Electric and allied firms. The third circuit court was reversed.

The suit arose when the General Electric charged the DeForest company with infringing upon the tube patent issued to Dr. Irving Langmuir in 1925, and effective until 1942.

This tube, a betterment of the original DeForest tube upon which modern radio tubes were built, was claimed by General Electric to constitute a remarkable invention, while the DeForest company contended it merely employed well-known principles.

Firms allied in the patent fight with DeForest claimed if the patent were upheld, the Radio Corp. of America would gain a virtual monopoly of radio telegraph communication, and the General Electric would realize tribute from the tube, X-ray and talking picture manufacturers.

In patent legal circles the case was regarded as the biggest radio patent suit since radio was developed and popularized.

Summary of Commission Rulings and Schedule of Hearings.

INTERSTATE COMMERCE COMMISSION.

June 9: Hearing on joint application of the Michigan Bell Telephone Co. and the East Shore Telephone Co., of Lakeside, Mich., for authority by the Michigan Bell company to acquire the properties of the East Shore company for the sum of $22,500.

ILLINOIS.

April 23: Orders issued approving traffic agreements between the Illinois Commercial Telephone Co. and the following companies: Dawson Township Mutual Telephone Co., Table Grove Telephone Co., Beason Telephone Co., Jamestown Mutual Telephone Co., Citizens Mutual Telephone Co., Herrick Limited Telephone Co., Boskydell Mutual Switchboard Association, Hartsburg Mutual Telephone Co.

April 23: The Intra State Telephone Co., of Galesburg, filed original sheet 8 to rate schedule I. C. C. 1, relative to rates for "plug-in telephone service" for rooms in hospitals, effective May 11. No action was taken by the commission.

April 23: Order approving lease executed on January 28, between the Illinois Bell Telephone Co. as lessor, and the American Telephone & Telegraph Co., as lessee, covering floor space located in the Illinois Bell company's exchange building in the city of Joliet.

April 29: Order approved denying motion on behalf of minority stockholders of Assumption Mutual Telephone Co. to dismiss proceeding; authorizing the Assumption Mutual Telephone Co. to purchase, and the Assumption Telephone Co. to sell the entire plant, equipment, franchises, rights, easements and all materials and property of the Assumption Telephone Co. free of all liens, for the consideration of the sum of $15,000.

The Assumption Mutual Telephone Co. was authorized to issue and sell $9,500 aggregate par amount of its common capital stock, consisting of 380 shares of the par value of $25 per share, and $5,500 aggregate principal amount of its promissory notes, maturing $1,100 principal amount, respectively, one, two, three, four and five years after date, the notes to be dated not later than May 1, 1931, bearing interest at 6 per cent per annum, upon the conditions set forth in the order.

The Assumption Mutual Telephone Co. was denied authority to execute a mortgage, and issue and sell $20,000 aggregate principal amount of first mortgage bonds.

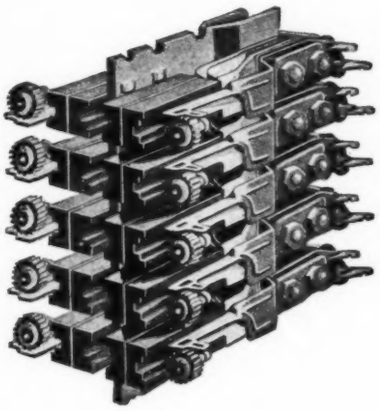
April 29: Order approved authorizing the Illinois Bell Telephone Co. to purchase, take and receive 1,861 shares of the common capital stock, and 1,707 shares of the preferred capital stock of the Wabash Telephone Co.

May 5: Order approving lease by the Illinois Bell Telephone Co. to the American Telephone & Telegraph Co. of floor space in the Illinois Bell company's exchange building in the city of Cairo.

May 5: Order approved authorizing the Illinois Bell Telephone Co. to purchase and the American Telephone & Telegraph Co. of Illinois to sell certain telephone property or interest in property located in the counties of Iroquois and Vermilion; and authorizing the Illinois Bell to sell and the American Telephone & Telegraph Co. to purchase certain telephone property or interest in property located in the same counties.

May 5: Order approved suspending until August 29 proposed rates for telephone service in Bement, Deland, Monticello, Colfax, Roanoke and Sibley, stated in rate

« « » » Cook No. 100 Central Office Protector

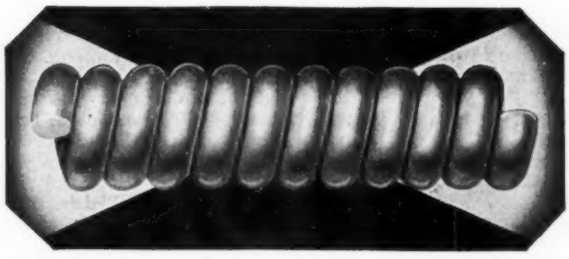


This protector contains ratchet type self soldering heat coils. No heat coil to solder, remove, turn or replace. This protector is furnished with wire wound, self-soldering heat coils, an alarm circuit and special carbon block arresters. The heat coils and carbons are mounted horizontally and are easily replaced. The positive permanent contact between heat coil and switchboard spring, the ease of relatching the coil, and the adequate testing facilities has made this protector a favorite among thousands of telephone engineers in this country and abroad. Further information on request.

« « » »

COOK ELECTRIC COMPANY

2700 Southport Avenue CHICAGO



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The amount of electricity actually stored in a Dry Battery depends primarily on the size of the cell and the skill and knowledge of the manufacturer. Whenever a rigid test is made Bright Star Products are proven Supreme. Leaders of the telephone industry have been using Bright Star since 1909.

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Chicago **HOBOKEN, N. J.** San Francisco

schedule I. C. C. 1, sheet 5 of the Illinois Commercial Telephone Co.

May 5: Wabash Telephone Co.'s original sheet 22A to rate schedule I. C. C. 1, filed applicable to Marshall; contains original rates for rural common battery eight-party service, effective May 16. No action was taken by the commission.

May 6: Order approved dismissing complaint of Phil Sheridan against the Stephenson County Telephone Co., filed March 19, for the reason that complainant has been notified that service would be furnished.

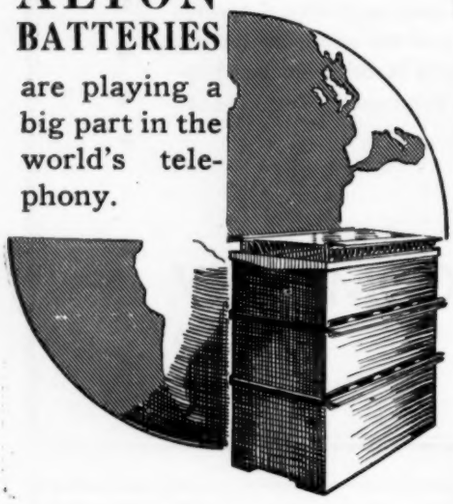
May 7: Batchtown Telephone Co.'s supplement to I. C. C. 5, rate of 25 cents per month for desk-set equipment effective June 1, filed and no action taken.

May 7: Illinois Bell Telephone Co.'s sheets 3A to I. C. C. 1, applicable to Au-

(*Please turn to page* 46.)

ALTON BATTERIES

are playing a big part in the world's telephony.



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Condensed Telephone News

Companies Are Urgently Requested to Forward to Us Promptly News Concerning Construction, Rebuilding, Financing, Election of Officers, Sales and Purchases of Exchanges or Other Activities

New Telephone Companies and New Incorporations.

WILMINGTON, DEL.—Articles of incorporation have been filed by the Interstate Telephone Co. with a capital stock of $2,500,000.

CAMPBELLSVILLE, KY.—Articles of incorporation have been approved for the Campbellsville Home Telephone Co., having a capital stock of $25,000.

The incorporators are John J. Jeter, W. T. Collins, W. N. McCubbin, O. C. Ramsey, John W. Ramsey, S. M. Richardson, J. P. Gozder, J. T. Mardis, C. B. Buchanon and S. P. Rice.

Financial.

CHICAGO, ILL.—A dividend of $2.00 per share was declared at a meeting of the board of directors of the Illinois Bell Telephone Co. on May 27, payable June 30, 1931, to stockholders of record June 29, 1931.

TOPEKA, IND.—Peoples Mutual Telephone Co. has filed notice of increase of capital stock from 400 shares at $5 each to 500 shares at $10 each.

Construction.

CHICAGO, ILL.—At its meeting on May 27, the board of directors of the Illinois Bell Telephone Co. approved expenditures of $146,516 for additions and betterments to the telephone plant in the city of Chicago; also $1,290,991 for the territory outside of Chicago, making a total of $1,437,507.

This brings the total amount approved for such additions and betterments so far this year to $7,752,015.

BLOOMFIELD, IOWA.—The new switchboard ordered by the Citizen's Mutual Telephone Co. has arrived and is being installed.

The manager of the company estimated that approximately five weeks will be required for installing the new switchboard. It will contain 640 city stations and 80 rural lines.

DETROIT, MICH.—At the regular monthly meeting of the board of directors of the Michigan Bell Telephone Co. held last month, the expenditure of $118,000 was authorized for new construction, according to an announcement made by Burch Foraker, president of the Michigan Bell Co. This is in addition to estimates previously approved this year amounting to $4,427,000, on which work is now being done.

HARBOR BEACH, MICH.—Installation of the dial telephone system here is planned by the Michigan Home Telephone Co. The entire system of that city will be rebuilt. The work of reconstruction of the lines is already under way.

New poles have been placed in position for stringing new cable. Some underground cable will also be placed.

Construction of the new telephone building will begin soon. The cost of all these improvements is expected to total $40,000.

NEW YORK, N. Y.—The expenditure of $1,830,120 for new construction was authorized by the board of directors of the New York Telephone Co. at the regular monthly meeting held May 27, according to an announcement by J. S. McCulloh, president.

This brings the total appropriations during the first five months of the year to $23,655,265, of which $19,207,265 has been provided for the extension of facilities in the metropolitan area.

Miscellaneous.

LITCHFIELD, KY.—The proposition of the Southern Continental Telephone Co. to install a new automatic telephone system at increased rates here in the near future was opposed by each member of the city council and the mayor at a special meeting recently.

EATON, OHIO.—The Eaton Telephone Co. which operates exchanges in Eaton and four other points in Preble County, has been sold to the United Companies of Abeline, Kans., according to the announcement of E. G. Morgan, manager of the company. The purchaser took over the company May 15.

The stock of the company has been held by the Interstate Telephone & Telegraph Co., of Indianapolis, a holding company which controlled approximately 85 telephone companies in Ohio and Indiana. This company was controlled by the Goodrich interests, which included former Governor James P. Goodrich, his son, Pierre Goodrich, R. W. Frost and others.

The Preble county holdings were acquired about three years ago and since that time until the sale were operated by the Interstate Telephone & Telegraph Co.

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Procedure for Making Cable Record Entries.

In making an assignment of cable pairs for the connection of a new subscriber, a vacant pair in the portion of the terminal having the least multiple with other terminals should be selected; otherwise all of the vacant pairs available in the terminal may be used.

When a subscriber contracts for service, the wire chief should select a vacant pair and indicate on the cable record opposite this rack number that the pair is assigned. This is to avoid assigning the pair to some other subscriber, in the event there is a delay between the time the subscriber's order is taken and the instrument installed. This initial entry should be erased and the permanent information written in at the time the subscriber's telephone is installed.

All entries such as the subscriber's number and terminal feed, should be made in pencil. The permanent information, such as terminal location and terminal layout, should be written in ink. When a telephone is left in a vacant building, this fact should be indicated opposite the cable pair to which the telephone is connected. When permanent trouble is

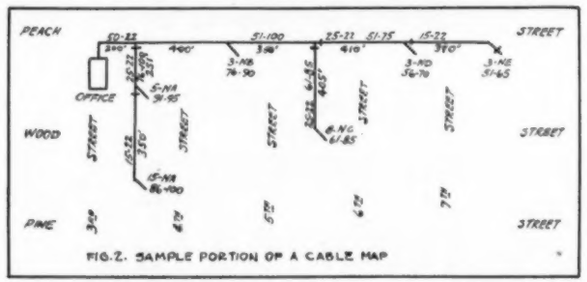

FIG. 2. SAMPLE PORTION OF A CABLE MAP

observed on vacant cable pairs, this fact should be indicated by a note in the line to the right of the corresponding rack number.

Cable records should be supplemented by cable maps showing the cable system, count, distance between terminals, gauge, terminal counts, etc. Fig. 2 shows a sample portion of such a map.

Cable record forms can be printed locally, or obtained from some nearby large company. The record sheets should be bound in a suitable binder, and always kept up to date.

Cable Terminal Designations.

There are several ways in which cable terminals may be designated. One of the simplest methods for the smaller exchanges consists in merely numbering terminals consecutively. A somewhat better arrangement, however, is to set up a scheme of designations which will indicate the approximate location of a terminal both in the block, and with respect to the central office. Fig. 3 shows this method.

It will be noted that the scheme is based on dividing the exchange into four sections with regard to the intersection

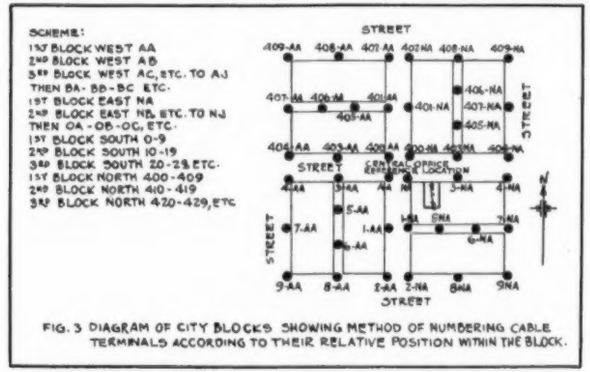

FIG. 3 DIAGRAM OF CITY BLOCKS SHOWING METHOD OF NUMBERING CABLE TERMINALS ACCORDING TO THEIR RELATIVE POSITION WITHIN THE BLOCK.

nearest the central office. The terminals in the northeast section are designated by numbers starting at 400 followed by NA, NB, etc.; the northwest section by numbers starting at 400 and followed by AA, AB, etc.; the southwest section by numbers starting at 1 followed by AA, AB, etc.; the southeast section by numbers starting at 1 followed by NA, NB, etc. The letter suffix indicates whether a terminal is in the east or west section; and the number indicates whether in the north or south section.

It will also be observed that the blocks adjacent to the reference intersection are lettered either AA or NA. With each additional block, going either east or west, the suffix is changed to AB, AC, AD until AJ is reached. The suffix then changes to BA, BC, to BJ; or going east, the suffix is NA, NB, NC, etc., to NJ, then OA, OB, OC, up to OJ, changing the first letter when J is reached and starting a new series.

It is evident that this system permits giving each block a separate letter suffix which indicates the number of blocks east or west from the office. Such a system permits numbering 130 blocks in each direction from the office without a conflict in letters.

The number of blocks north or south a terminal may be from the office is indicated by increasing the terminal designations by ten for each block north or south of the reference intersection. For example, the first block north of the office is 400 to 409, the second block 410-419, etc. This permits numbering 40 blocks south without conflict in numbering.

The position of the terminal in the block is indicated by the last digit of the number; that is, the terminals occupying the same relative positions as shown in Fig. 3 would be assigned the same last digit.

This numbering system is not complicated. It represents a systematic method of designating cable terminals and a few minutes' study should make it clear to anyone.

Pole Preservative Methods.

Lowry Process.

A very popular method of treating southern yellow pine poles is the "Lowry Process." The Lowry process differs in several respects from the methods previously described. The principal difference is that the poles are not subjected to the initial air prior to filling the charging cylinders with creosote. This data sheet covers this method of treating poles.

PREPARATION OF POLES: All poles to be treated shall be air-seasoned; or if sufficient time is not available for air-seasoning, an equivalent condition shall be obtained in the shortest time by steaming at a pressure not to exceed 20 pounds.

Poles shall be framed before treating. Each charge placed in the treating cylinders should be the same kind and approximately the same size material. Each charge shall be loaded in a manner that will insure that all surfaces of every piece will be in contact with the preservative.

PRESERVATIVE: The preservative used shall be either creosote or creosote coal tar solution, as ordered, and must conform to the specifications of the American Wood Preservers Association for these materials.

TREATMENT, LOWRY PROCESS: The quantity of creosote left in the wood is optional with the customer. The average retention of creosote on any order shall be at least 100 per cent of that specified.

Under the Lowry process the charge shall be placed in the cylinder at atmospheric pressure, and the cylinder quickly filled with preservative at a temperature not less than 175 degrees nor more than 200 degrees Fahr. Pressure shall be applied and maintained until there has been injected into the wood the largest volume of preservative which it is possible to reduce to the required final retention by a subsequent quick high vacuum. The temperature of the preservative during the pressure period shall not be less than 160 degrees Fahr., nor more than 200 degrees Fahr.

When the gross absorption desired has been obtained, the cylinder shall be quickly emptied of preservative and a vacuum of not less than 22 inches drawn and maintained for at least 30 minutes.

Effect of Creosote on Pole Life.

Creosote oil injected into the wood cells of a pole destroys the decay-producing fungi, and retards and prevents further fungi growth. It also prevents the pole being destroyed by white ants (termites) or other forms of insect life.

It is generally agreed that creosoted poles are much less subject to damage from grass fires than are untreated poles. This is explained by the fact that if a creosoted pole is ignited the oil burns first, acting as a wick and deposits a coat of carbon on the surface of the pole. This coating of carbon shuts out oxygen and retards further combustion.

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MANUFACTURERS' LITERATURE

The following is a brief description of recently published bulletins, catalogs, etc. If you are interested in obtaining copies address your request to the manufacturer.

Notices Not Previously Published

SWITCHBOARDS (P-A-X's)

Engineering Bulletin 322, dealing with Type 50 Strowger P-A-X, is now available. It will be sent to any telephone man interested in Private Dial Systems of fifty lines and up. **Automatic Electric, Inc., 1033 W. Van Buren St., Chicago, Ill.**

Notices Previously Published

ADDRESSING MACHINES

Two circulars announcing two new models—the Class 2700 All-Purpose Addressograph and the Class 5100 Addressograph. Illustrated and fully descriptive of the uses for which they are designed. **Addressograph Co., 1814 E. 40th St., Cleveland, O.**

POLE SETTERS

"Highway Model D Earthboring Machine and Pole Setter" is the title of a 4-page bulletin describing and illustrating the application of this equipment on any 1½ or 2 ton truck and its uses. **Highway Trailer Co., Edgerton, Wis.**

RINGING CONVERTERS

Bulletin No. 150 entitled "Leich Ringing Converters" describes and illustrates converter equipment for producing ringing current; this includes harmonic converters, ringing frequency converters and ringing converters with charger equipment. **Leich Electric Co., Genoa, Ill.**

TELEPHONE BOOTHS

"Sound Proof Telephone Booths" is the title of an 8-page bulletin covering specifications and photographs of a new line of booths constructed of Presdwood. **Allen A. Wilkinson Lumber Co., Pine and Michigan Streets, Indianapolis, Ind.**

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News Facts Education Assistance

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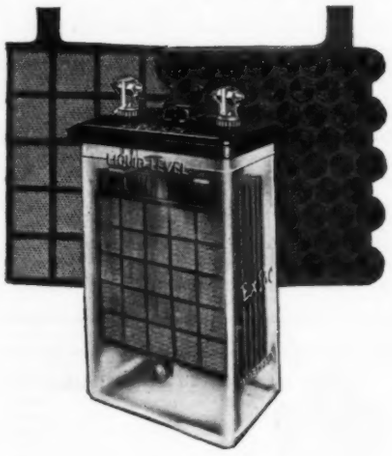

A typical cell of the Exide Chloride Battery so widely used in telephone service.

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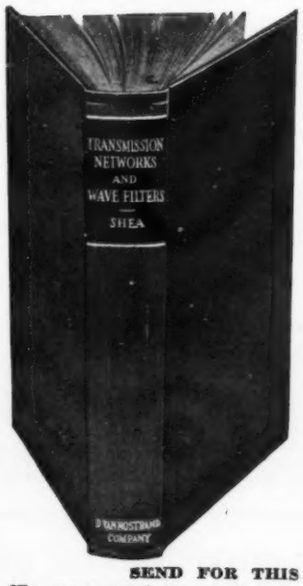
By
T. E. SHEA, B. S., M. S.
Member of the Technical Staff, Bell Telephone Laboratories



The calculation and design of telephone networks and wave filters are fully presented in this book, written by Mr. T. E. Shea of Bell Telephone Laboratories. It embodies the most recent developments in this field as well as the standard practice.

"The Telephone Equipment of 1929," "The New Science Telephony," "Transmission Networks and Wave Filters" and "Radio Broadcasting Engineering" are a few of the subjects capably discussed in this valuable book.

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WHAT THE COURTS AND COMMISSIONS ARE DOING.

(*Concluded from page* 42.)

rora and Evanston, reduction in rates to P. B. X. subscribers at these exchanges, effective May 25, filed and no action taken.

May 12: Order approved cancelling and annulling rate schedules I. C. C. 1, sheet No. 5, for Sheridan, West Brooklyn, Leland, Paw Paw, Somonauk, Earlville and Compton; and I. C. C. 1, original sheet 7, for Sandwich and Mendota of the Illinois Commercial Telephone Co., covering extra charge for desk-set equipment.

May 12: Orders issued approving traffic agreements between the Illinois Commercial Telephone Co. and the Mulberry Grove Mutual Telephone System, the Gridley Telephone Co., the Danvers Telephone Co. and the Deer Creek Telephone Co.

May 19: Traffic agreement approved between the Illinois Commercial Telephone Co. and the Middle States Telephone Co.

May 19: Order issued approving lease of certain premises in Milledgeville by the Chicago, Burlington and Quincy Railroad Co. to the Milledgeville Mutual Telephone Co.

May 19: Order approved extending until November 23, period of suspension of the proposed rates for telephone service in Mt. Vernon, stated in rate schedule I. C. C. 2 of the Illinois Bell Telephone Co. The commission will investigate the reasonableness of the proposed rates.

May 19: Order issued approving lease of land in Kirkwood by the Chicago, Burlington & Quincy Railroad Co. to the Illinois Commercial Telephone Co.

May 20: Traffic agreement approved between the Illinois Commercial Telephone Co. and the Automatic Home Telephone Co.

MINNESOTA.

June 2: Hearing on complaint of the Aure Farmers Co-Operative Telephone Association alleging invasion of territory by the Alaska Township Telephone System, cancelled.

The commission will set a later date for hearing in the matter.

June 11: Hearing in Pelican Rapids on application of Alexander Small, Horace Cocking, A. C. Springer, Theo. Gilbertson, et al., for investigation of rates and charges for rural telephone service by the Pelican Telephone Co.

MISSOURI.

May 20: Application filed by Elizabeth Johnson and Allen Buerge for approval of sale of the telephone exchange known as the Johnson Telephone Exchange which operates in Jasper county.

NEW YORK.

May 27: Application of the New York Telephone Co. for authority to purchase the properties of the Byron Telephone Co., located in Genesee and Orleans counties, approved.

OHIO.

May 26: Hearing relative to the Ohio Bell Telephone Co. rate case, indefinitely postponed at the request of Attorney General Gilbert Bettman because of the illness of Assistant Attorney General Thomas Herbert, who is special counsel for the commission.

June 24: Continued hearing on rate case of the Warren Telephone Co., of Warren, which seeks increased rates.

The hearing has been postponed a number of times at the request of the telephone company.

OKLAHOMA.

June 18: Continued hearing on complaint of B. Richardson vs. the Standard Telephone & Telegraph Co., alleging inadequate service at Carter.

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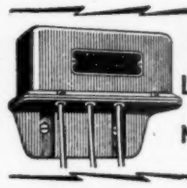
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ARKANSAS ANNUAL MEETING AT HOT SPRINGS.

(*Concluded from page* 21.)

through the medium of speakers and literature, but such efforts have reached only those more or less informed concerning the work of the utilities. The opinion people form of corporations and utilities is largely from contacts they have had with the employes of those interests.

After addresses by R. B. Miles, Chicago, of the Kellogg Switchboard & Supply Co., on "Today's Switchboard and Tomorrow's Profits," and C. B. Allen, Little Rock, division plant superintendent of the Southwestern Bell Telephone Co., on "Quality of Repair and Installation Work," the convention was declared adjourned.

Traveling Traffic Supervisor for Lincoln, Neb., Company.

R. S. Brewster, of Lincoln, Neb., traffic superintendent of the Lincoln Telephone & Telegraph Co., has announced the appointment of Miss Agnes Scouller as traveling traffic supervisor. Miss Scouller has been with the company almost from its beginning, and has had in all 29 years of service in the traffic department of telephone work.

She began with the Nebraska Bell company when it operated in Lincoln and was chief operator of its exchange there in 1908. When the Lincoln company acquired the property, she went to it with the same title. She has been very popular with the operating forces during these years, and has superintended a number of activities in connection with the employment of women in the telephone industry.

Mr. Brewster feels that with her long experience in traffic work, Miss Scouller is especially well-fitted for her new duties, which include supervision of chief operators, observation of working conditions, training of operators, conducting operators' classes on operating methods and practices and allied work.

Vermont Association to Meet at Rutland This Month.

The Vermont Telephone Association has selected June 16 and 17 as convenient dates on which to hold its annual convention this year. The convention will be held at Rutland.

C. D. Cushing, of Bethel, is president of the association. A good attendance is expected at the convention which will be held at the Rutland Armory.

Annual Convention of Canadian Companies to Be Held June 23.

The annual convention of the Western Counties Telephone Association will be held in the city hall at London, Ontario, Can., on June 23. All telephone companies in that part of Canada are urged to have a representative attend this meeting.

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Western Elec. No. 317 inside connection 3-bar 1000 or 1600 ohm Bdg. compacts @	8.25
Kellogg No. 28 Unbreakable type desk set with W. E. No. 315 inside connection 3-bar 1000 or 1600 ohm signal sets @	10.00
Leich Elec. desk set complete with Stromberg 4-bar 1000-1600 or 2500 ohm inside cord connection signal set @	8.75
Western Elec. No. 329 or 323 Transmitters with back and Mouthpiece @	1.25
Automatic Elec. Receivers with repolished shell and new Cord @	1.00
Leich Elec. No. 7a Ringing machine, operates off 110 volts A. C. light Ckt., @	20.00
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11 pair M-13	2.50
51 pair M-13	6.50
25 pair M-4	3.50
53 pair M-4	5.00
5 pair M-8	2.00
10 pair M-8	2.25
16 pair M-8	3.00
26 pair M-8	4.00

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FOR SALE—3 Positions of No. 9-D Toll and 4 Positions of No. 9-D straight Common Battery local sections with 600 No. 34-B signals, no line jacks. This equipment is in fair condition. Price—$1,000.00 F.O.B. Lincoln, Nebraska. 1 Power Board and General Electric Company 20-ampere rectifier, $200.00 F.O.B. Lincoln, Nebraska. Address F. M. Strasser, care Lincoln T. & T. Co., 14th and M Sts., Lincoln, Neb.

CABLE TERMINALS FOR SALE—Two Western Electric fifty pair protected, never used; two W. E. pole seats, new, for less than half price. Several used Cook protected terminals and junction boxes, 15 and 25 pair, very cheap. Nebraska Central Telephone Co., Gibbon, Neb.

FOR SALE — Rectifiers, Westinghouse—Used—Cleaned—3 Cooper Hewitt—Rectifier Type—A.T. 50 Amp. 110 to 220 V., A.C., 60 Cy.—Style 300305, 11 to 25 cells (new style), less tubes, each $275.00; 1 Cooper Hewitt—Rectifier Type—A.T. 50 Amp., 110 to 220 V., A.C., 60 Cy.—Style 220249-C, 11 to 17 cells (old style), less tubes, each $175.00; 1 Cooper Hewitt Rectifier Type A.T., 50 Amp., 110 to 220 V., A.C., 60 Cy.—Style 220250-B, 11 to 17 cells (old style), less tubes, each $175.00. Prices are F.O.B. Rochester, New York. Stromberg-Carlson Telephone Mfg. Co., Rochester, New York.

POSITIONS WANTED

POSITION WANTED—By telephone man of wide experience in all lines of telephone work, switchboard, maintenance, line work, commercial, traffic, Capable manager. Would consider buying in later. Excellent references. Address 7969, care of TELEPHONY.

POSITION WANTED—Can do all kinds of plant accounting work. Experience 2½ years. Address 7981, care of TELEPHONY.

POSITION WANTED—By first-class cable splicer and all-around Telephone man. Address 7982, care of TELEPHONY.

POSITION WANTED—As switchboard installer, wire chief or maintenance; 10 years' experience; all makes equipment, mostly S. C. and W. E. Good references. Address 7988, care of TELEPHONY.

POSITION WANTED—Cable splicer (25), high school graduate; 6 years Bell System; Repairman, Maintenance, Construction; contract, steady; 2 years' experience Telegraph Printer. Address 797, care of TELEPHONY.